

POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

REG'D. TRADE MARK, GREAT BRITAIN, No. 410826

REG. U.S. PAT. OFF.

Boat Launcher
Page 125



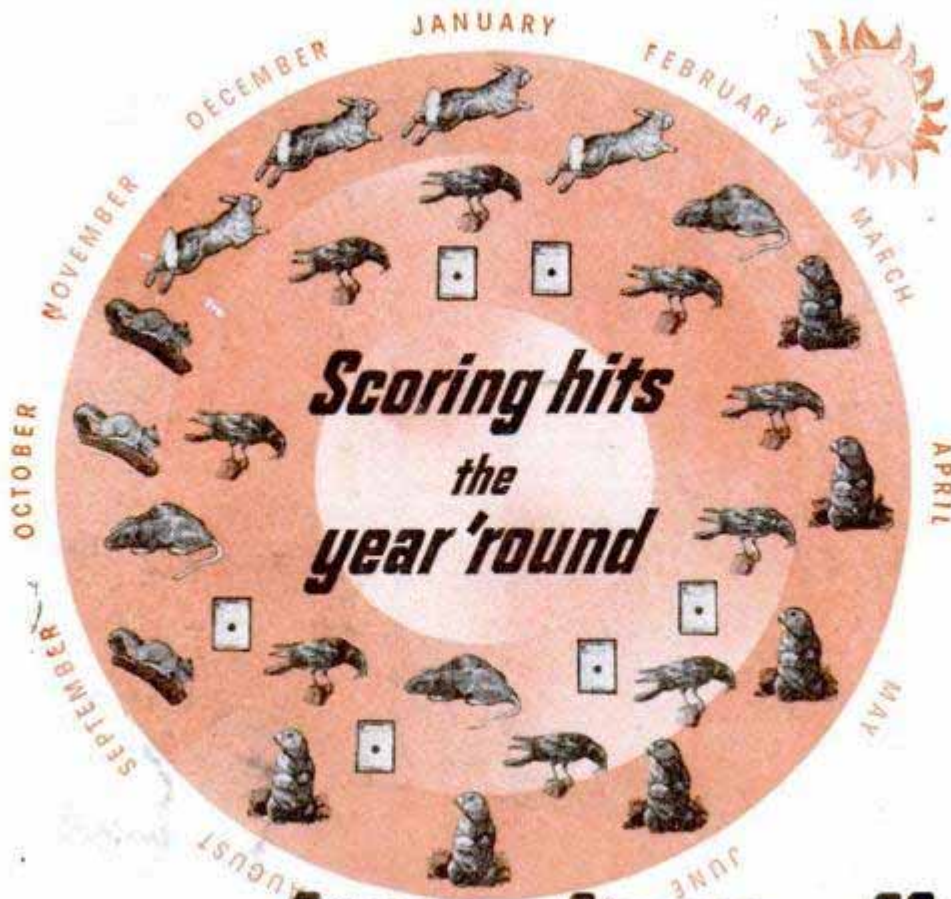
In This Issue

ROUNDUP OF THE STATION WAGONS

What Owners Say About the
STUDEBAKER

For the Craftsman





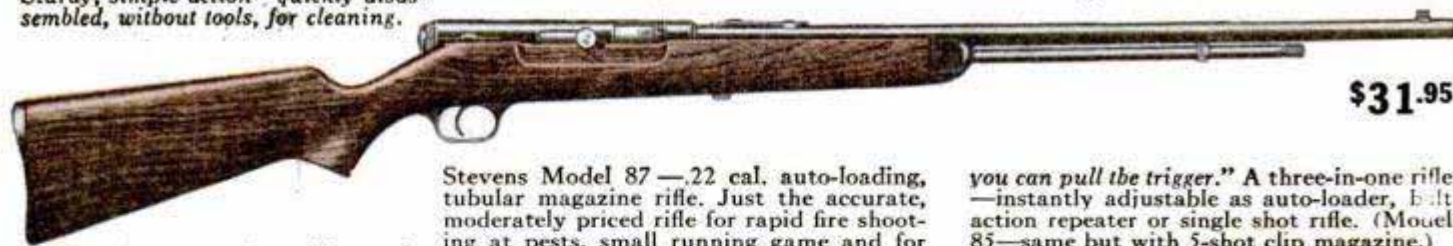
Savage... Stevens... 22 Rifles



Sturdy, simple action—quickly disassembled, without tools, for cleaning.

Shoot... Fall, Winter, Spring, Summer—year 'round—with a Savage or Stevens "22" rifle. They're built to give you top dependability—more exclusive features—more value and more shooting fun in any season!

You'll find just the "22" you want in the complete Savage-Stevens line of lightning fast auto-loaders—smooth operating slide and bolt action repeaters and handy, reliable single shot rifles. Stop in and look 'em over at your dealer's today. Send for free catalog. Savage Arms Corporation, Firearms Division, Chicopee Falls, Mass.

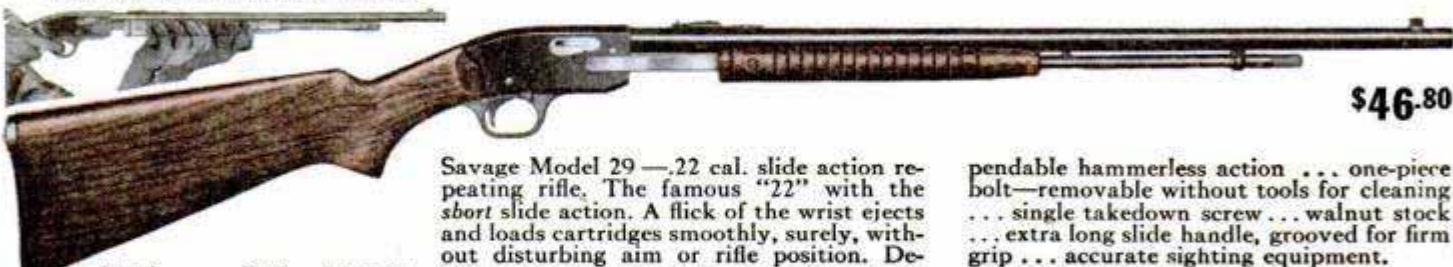


\$31.95

Short forearm stroke—slide travels only $1\frac{1}{4}$ " in loading and ejecting.

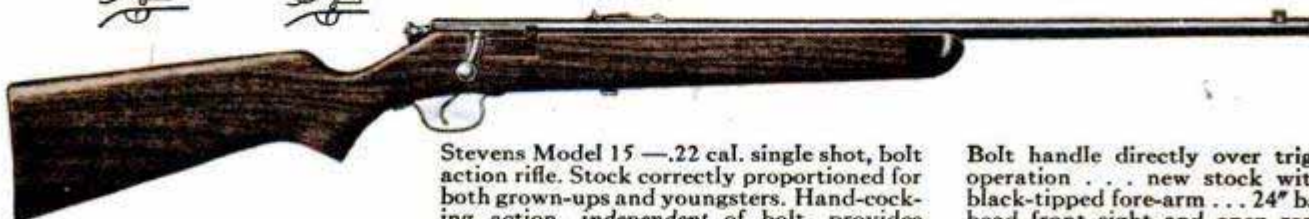
Stevens Model 87—.22 cal. auto-loading, tubular magazine rifle. Just the accurate, moderately priced rifle for rapid fire shooting at pests, small running game and for year 'round plinking fun. "15 shots as fast as

you can pull the trigger." A three-in-one rifle—instantly adjustable as auto-loader, bolt action repeater or single shot rifle. (Model 85—same but with 5-shot clip magazine.)



\$46.80

Savage Model 29—.22 cal. slide action repeating rifle. The famous "22" with the short slide action. A flick of the wrist ejects and loads cartridges smoothly, surely, without disturbing aim or rifle position. Dependable hammerless action... one-piece bolt—removable without tools for cleaning... single takedown screw... walnut stock... extra long slide handle, grooved for firm grip... accurate sighting equipment.



\$13.85

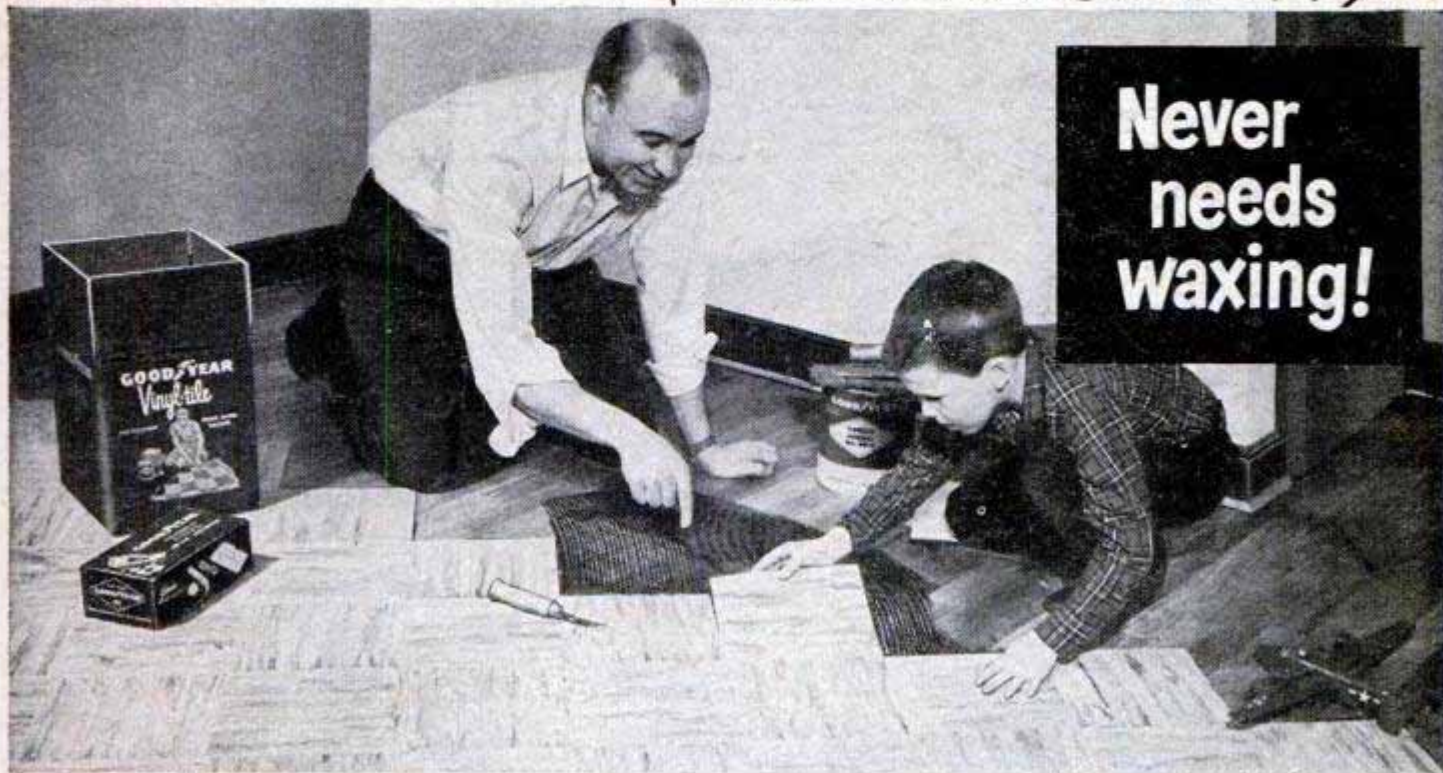
Stevens Model 15—.22 cal. single shot, bolt action rifle. Stock correctly proportioned for both grown-ups and youngsters. Hand-cocking action, independent of bolt, provides maximum safety. Other features include:

Bolt handle directly over trigger for fast operation... new stock with handsome black-tipped fore-arm... 24" barrel... gold bead front sight and open rear sight with elevator.

HE SAID:

"Aw, Pop—that looks easy!"

(AND HE PROVED IT!)



I felt proud installing Goodyear VINYL-TILE in my son's room—he was watching me like a hawk, and I was doing a real "professional-looking" job. Then suddenly he said, "Aw Pop, that looks easy" — and before I knew it he was laying the tile himself!

He proved he was right—and my wife proves that I was right when I selected VINYL-TILE as a handy-man project in my home.

She says it's a "snap" to keep the boy's room clean now, for this wonderful new flooring *never needs waxing*—is impervious to spills and stains—requires only the swish of a sudsy mop to keep it as fresh as new!

There are 18 beautiful colors to choose from, and the handy installation kit makes it so easy to do it yourself!

SEND FOR THE FREE VINYL-TILE "SELF-INSTALLATION" BOOKLET—address a post-card to:

Goodyear, Flooring Dept. 9-M, Akron 16, Ohio



FLOR-MASTER INSTALLATION KIT

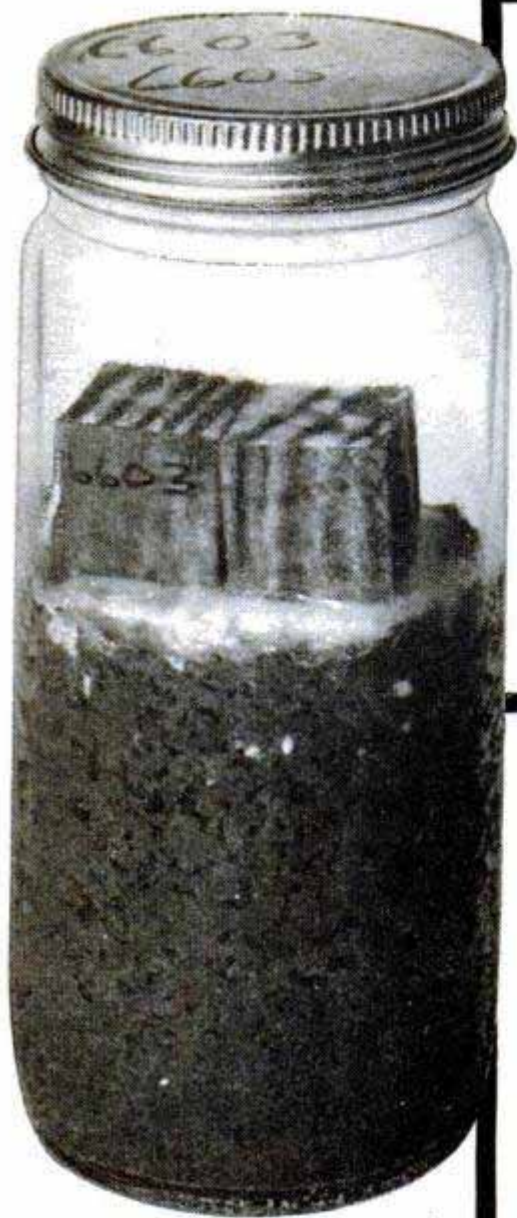
provides the simple tools required to do a professional job in jig time. Available at all better dealers'—where Goodyear VINYL-TILE is sure to be a featured item.

Flor-Master—T. M.

The Goodyear Tire & Rubber Company, Akron, Ohio

GOOD YEAR Vinyl-Tile

By the Tile • By the Roll • FOR FLOORS • WALLS • COUNTER TOPS



THIS BOTTLE TURNS SEVEN YEARS INTO SEVEN MONTHS

Test blocks of pole wood are fed to destructive fungi in bottles like this at Bell Laboratories. Wood rests on soil which controls moisture conditions and promotes fungus growth. Test speeds search for better preservatives.

This year the Bell System is putting 800,000 new telephone poles into service. How effectively are they preserved against fungus attack and decay?

Once the only way to check a preservative was to plant treated wood specimens outdoors, then wait and see—for seven years at least. Now, with a new test devised in Bell Laboratories most of the answer can be obtained in seven months.

Cubes of wood are treated with preservatives, then enclosed in bottles with fungus of the most destructive kind, under temperature and humidity conditions that accelerate fungus activity. Success—or failure—of fungus attack on cubes soon reveals the best ways to preserve poles.

The test has helped show how poles can be economically preserved for many years. It is another example of how Bell Telephone Laboratories works to keep down your telephone costs.

A boring is taken from a pole section to see how far preservative has penetrated. For poles to last, it must penetrate deeply and be retained for a long time.



BELL TELEPHONE LABORATORIES

Improving telephone service for America provides careers for creative men in scientific and technical fields.

Popular Mechanics Magazine

Registered in U. S. Patent Office and Canada

H. H. WINDSOR, Founder

H. H. WINDSOR, JR., Editor and Publisher



this month's cover

"ROLLING" across the beach is a Boat-Lift, a simple solution to that age-old problem of boaters—how to launch their craft. You'll find all the details on page 125. The cover itself, by Carl Pemble, is typical of the way PM covers are made, a long and painstaking process. All available photos, drawings and descriptive information on the cover subject (in this case the Boat-Lift) are turned over to an artist, who often works for a period of weeks to come up with as many as a half-dozen different cover sketches. The sketches are studied carefully by the editor and the publisher and others. When one of them is approved, any desired changes are marked on the sketch, which is resketched or photostated and blown up to twice the finished size. After research and sometimes a visit to the scene, the artist finishes the painting, usually in water colors but occasionally in oils

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IN THIS ISSUE

Don't Try to Beat the Customs - - - -	65
Hens Never Had It So Good - - - -	72
Bringing Back the Red Salmon - - - -	81
"Canoe-Cat" for Spearfishing - - - -	88
The Owners Report on the Studebaker - - -	98
Jack of All Trades—the Station Wagon - -	106
What Comes After the Iron Horse? - - -	116
What's New for Your Home - - - - -	126
Hurricanes on Leash - - - - -	134
Radio, TV and Electronics - - - - -	141

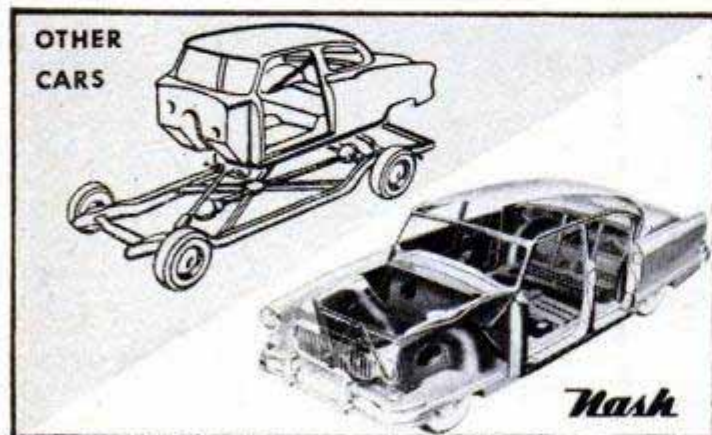
For the Craftsman

Rocking Bronc for TV Cowboys - - - -	145
Hard Work + Soil Chemicals = Fine Lawn -	148
Glue for Fun and Profit - - - - -	161
Bookshelf Wall Features Built-Ins - - -	164
The New Trend—Window Cornices - - -	174
Clean Plugs Spark Your Car - - - - -	181
Measuring and Marking Wood - - - - -	190
Metal Turning Freehand - - - - -	198
Clinic for Homemakers - - - - -	206

Other items, and manufacturers of available products described, are listed on pages 12, 14 and 16

Do You Know?

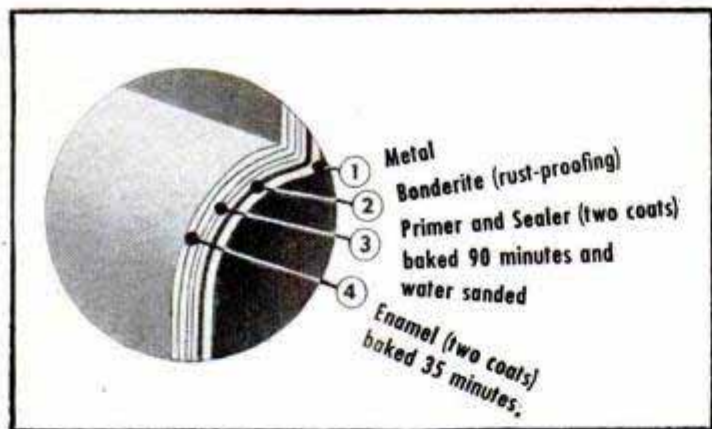
Why Nash Automobiles Stay New Years Longer?



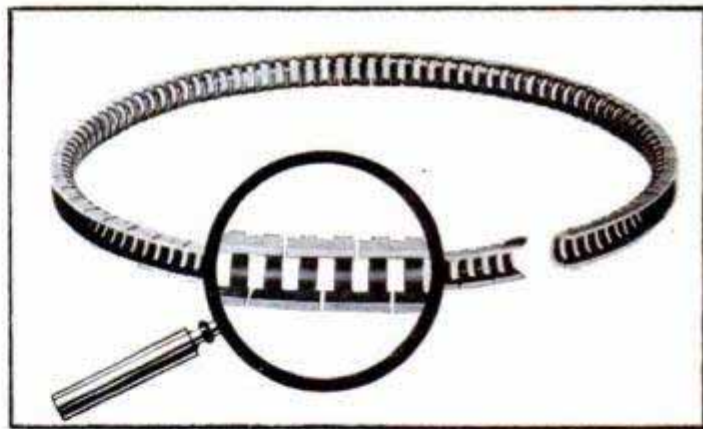
Ordinary cars have *separate* frame and body bolted together, which tend to loosen from road shocks and vibration, causing squeaks and rattles. In Nash Airflyte Construction, body and frame are welded into one unit that stays tight as new years longer.



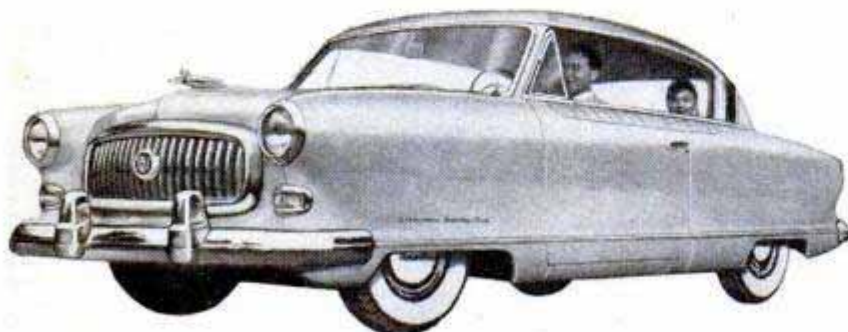
Scientific tests show Nash Airflyte Construction has twice the torsional strength (resistance to twisting) of ordinary design—with greater life-saving strength surrounding the passenger compartment—strength that adds many miles to the life of a Nash.



To preserve the beauty of the baked enamel finish, all Nash cars are treated with Bonderite. This process provides an anchor for the finish, retards rust, cracking, chipping or peeling of the hard enamel—insures lasting beauty.



The "U-Flex" oil control ring, shown above, is typical of the many advanced engineering features found in all Nash engines. The slotted design meters a controlled quantity of oil and maintains uniform pressure. Uses less oil, increases engine life.



Nash cars are *designed* and *built* to remain new years longer. See and drive the new 1953 Nash Airflytes, Ambassador, Statesman, Rambler, styled by Pinin Farina, at your Nash dealer's. You'll find there are—

None So New As *Nash* Airflytes

Nash Motors, Div. Nash-Kelvinator Corp., Detroit, Mich.

Claims! Claims! Claims!

But now comes this solid

FACT!

HERE is a Guarantee with teeth in it! "If, after 500 miles," it says, "you are not satisfied RING-FREE is doing these things...your money will be refunded by your dealer immediately."

Sweeping aside empty claims, Macmillan backs up every statement about RING-FREE Xtra Heavy Duty Motor Oil with this iron-clad Guarantee.

Could we possibly make a stronger statement than that? Could we give you greater assurance that you will get what we say you will get? Could there be a greater difference between the usual advertising puffery and a sincere, down-to-earth pledge like that?

R. S. Macmillan President

MACMILLAN PETROLEUM CORPORATION
LOS ANGELES • CHICAGO • NEW YORK

Guarantee

Because Macmillan Ring-Free Xtra Heavy Duty Motor Oil will remove carbon, retard oxidation, resist heat, prevent corrosion, and noticeably reduce friction, we guarantee it will:

- 1 Increase the horsepower of your engine.
- 2 Give more miles per gallon of gasoline.
- 3 Prevent valves from sticking, including hydraulic valve lifters.
- 4 Reduce annoying engine "ping".
- 5 Reduce wear and repair.

Drain and refill with Macmillan Ring-Free Xtra Heavy Duty Motor Oil, and, if after 500 miles you are not satisfied that Ring-Free Xtra Heavy Duty is doing the things listed above, your money will be refunded by your dealer immediately.

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Macmillan Petroleum Corporation
530 West Sixth St., Los Angeles 14, California

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- ☐ I want to add "the best for less" to my car. Please tell me more about Pyroil.
- ☐ Send FREE Pyroil metal savings bank (postage-paid). Holds up to 50c in coins.

Name _____

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City or Town _____ State _____

Make of car _____



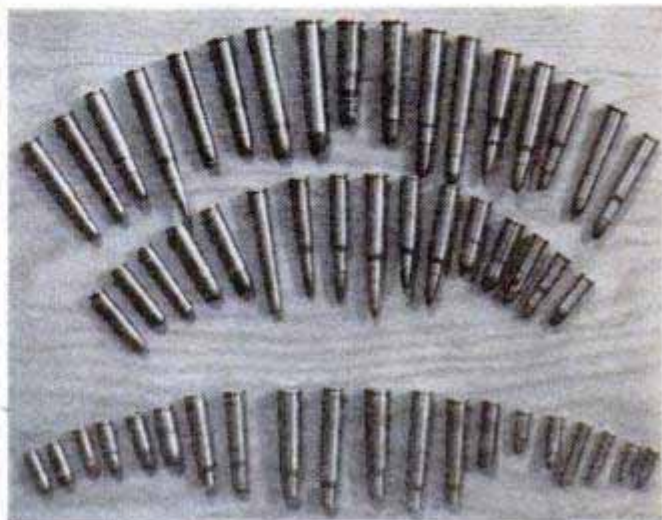
in this corner.....

THE EDITORS



Cartridges Tell a Story

Most hunters, points out George C. Mattis of Birchwood, Wis., will invariably pick up a discarded cartridge shell and examine it. Usually they'll throw it away, which is a mistake, Mattis says. He has a collection



of discarded shells taken from the deer area of northern Wisconsin some 30 years ago and, in a small way, they show the history of the rifles used in that area.

Most of the shells were for use in foreign army rifles—Arabian, Swiss, French and British. These rifles were sold to early settlers by hardware stores for about five dollars with a box of cartridges thrown in. Where they got more cartridges after the box was exhausted was their own worry.

To the Editor:

Automobiles, in their progress toward perfection, have greatly outdistanced two other important and related factors—the driver and the roads upon which they travel. Any car built today is relatively dependable in so far as engine, transmission, brakes and visibility are concerned. There may be variations in riding qualities and other mechanical details in the different makes of cars, but all cars should have two things in common: The best obtainable *roadability* and *maneuverability*.

When a car manufacturer learns the hard way (possibly bankruptcy) that he must make a safe car rather than a fast one, or large one, or one overloaded with chrome, he will be compelled to design his cars primarily for roadability and maneuverability. Or he should be compelled

(Continued to page 8)

This **FREE SAMPLE LESSON** will prove you can become an expert **BOOKKEEPER... ACCOUNTANT** **OR C.P.A.**



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LaSalle-trained
Accountant's
success could
be yours.

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Assignment 1

THE BALANCE SHEET



QUOTING from the "Journal of Accountancy," the authoritative organ of the professional accountants of the United States:
"...the accounting profession is probably the best paid in the world. If there be a profession in which the average compensation is higher, it is not known to us."
"There is need for accountants. There is ample compensation for accountants. There is no prospect that the supply will overtake the demand within the lifetime of even the youngest of us."

LaSalle Extension University
A Correspondence Institution
CHICAGO

THIS SAME LESSON HAS STARTED HUNDREDS OF THOUSANDS toward well-paid accounting careers—in business, government, and as C.P.A.'s. Even without previous knowledge, progress is rapid—earning power climbs fast. This sample lesson shows why.

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So right now, today... if you are an adult, employed, and earnestly ambitious for rapid advancement in this highest-paying of all professions... send your name and address on the coupon below. We'll send the free sample lesson—plus our 48-page book outlining today's career opportunities and how you can qualify for them. A coupon like this has started many thousands toward greater success. It can do the same for you. Mail it today!

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in the U.S. have
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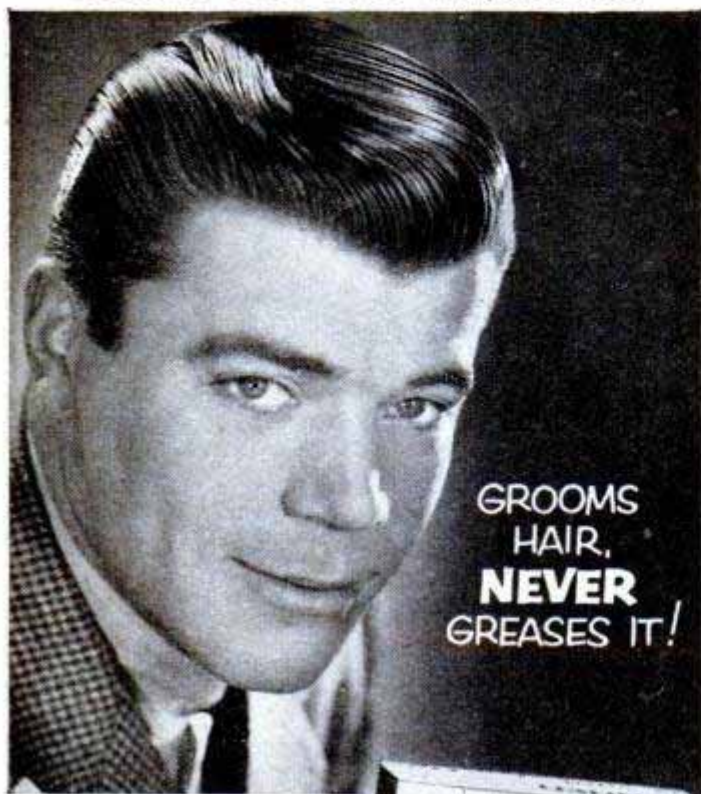
GOOD-PAY JOBS IN 5 BIG FIELDS

If you were an expert accountant right now, chances are you would find yourself among the highest-paid of all professional men and women. Surveys show that accountants earn more than those in other major professions.

There are five big fields of opportunity open to Accountancy-trained men and women... opportunities that are wide open and highly inviting, offering maximum income and job security in good times or bad. And under LaSalle's "Problem Method" you can start earning while still learning—either in spare-time or full-time employment... or in business for yourself with no capital required.

Get the latest information by sending for our 48-page book, "Accountancy, the Profession That Pays"... plus free sample lesson. The coupon at right will bring both to you without cost or obligation. LaSalle Extension, 417 S. Dearborn St., Chicago 5, Ill.

Keeps hair in place -leaves no trace!



GROOMS
HAIR,
NEVER
GREASES IT!

AT LAST, a hair groom that keeps your hair neat, well-groomed, good-looking, and yet never leaves a tell-tale trace! Change today to Mennen Cream Hair Oil. It's lightly blended to groom hair, but never grease it. Contains lanolin. Helps remove dandruff scales and relieve dry scalp. Economical, too. Get a bottle today!



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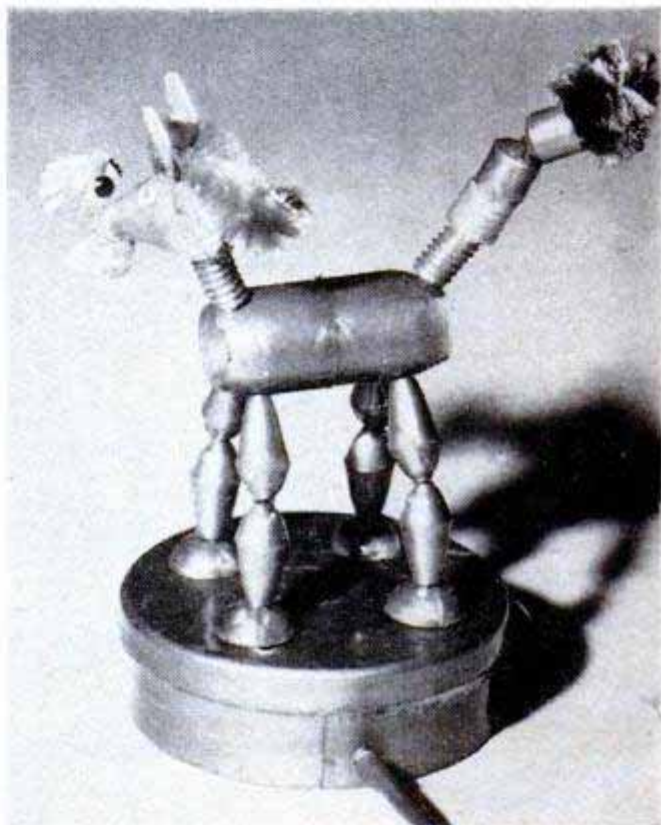
(Continued from page 6)

by law to obey these two supreme tenets of automotive engineering. This may seem farfetched, but not when we recall how the government protects the public in other ways: Pure-food laws, label laws, conservation laws, etc.

Hugo F. Scatena,
Fairfield, Conn.

"Talking" Horse

The dashboard used to come behind the horse. Here's a horse that rides on top of the dashboard. Our West Coast editor discovered this agitated mechanical animal in



Los Angeles. Actually it's a loose-jointed metal horse that, teed into the vacuum system of an automobile, reacts by sagging or perking up in accordance with the performance of the car engine. Actually a vacuum gauge in disguise, the attitude of the horse will, says the manufacturer, reflect gasoline mileage, horsepower, altitude and driving efficiency.

To the Editor:

I've been reading your magazine for more than 12 years; it gets better and more interesting every number. It is indeed a pleasure to know that the American people can enjoy so much for so little.

I am a Brazilian, from Rio de Janeiro, studying textiles and mechanics in this great country. My favorite magazine is PM, which I consider as one of the best

(Continued to page 10)

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She's holding a sheaf of reports from I. C. S. ten-year graduates. This group alone shows an average pay increase of 103%. You can match it!

Returns from 21 states... from accountants, draftsmen, engineers, technicians... show the following important facts about your expected income over a ten-year period.

	Age 30	Age 40	% Increase
Average income for all U.S. men	\$2,449.00	\$2,845.00	16%
Average income for college graduates (men)*	\$3,537.00	\$4,618.00	30%
Average income for 41 I. C. S. graduates surveyed Jan. '53	\$2,514.63 before I. C. S. training	\$5,114.84 today	103%

* From "They Went to College," Haverman & West

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type="checkbox"/> Concrete Construction</p> <p><input type="checkbox"/> Sanitary Engineering</p> <p>DRAFTING</p> <p><input type="checkbox"/> Aircraft Drafting</p> <p><input type="checkbox"/> Architectural Drafting</p> <p><input type="checkbox"/> Electrical Drafting</p> <p><input type="checkbox"/> Mechanical Drafting</p> <p><input type="checkbox"/> Structural Drafting</p> <p><input type="checkbox"/> Sheet Metal Drafting</p> <p><input type="checkbox"/> Mine Surveying and Drafting</p> <p>ELECTRICAL</p> <p><input type="checkbox"/> Electrical Engineering</p> <p><input type="checkbox"/> Electrician</p> <p><input type="checkbox"/> Electrical Maintenance</p> <p><input type="checkbox"/> Electrical Drafting</p> <p><input type="checkbox"/> Electric Power and Light</p> <p><input type="checkbox"/> Lineman</p> <p>HIGH SCHOOL</p> <p><input type="checkbox"/> High School Subjects</p> | <p><input type="checkbox"/> College Preparatory</p> <p><input type="checkbox"/> Mathematics</p> <p><input type="checkbox"/> Commercial</p> <p><input type="checkbox"/> Good English</p> <p>MECHANICAL AND SHOP</p> <p><input type="checkbox"/> Mechanical Engineering</p> <p><input type="checkbox"/> Industrial Engineering</p> <p><input type="checkbox"/> Industrial Supervision</p> <p><input type="checkbox"/> Foremanship</p> <p><input type="checkbox"/> Mechanical Drafting</p> <p><input type="checkbox"/> Machine Design-Drafting</p> <p><input type="checkbox"/> Machine Shop Practice</p> <p><input type="checkbox"/> Tool Design</p> <p><input type="checkbox"/> Industrial Instrumentation</p> <p><input type="checkbox"/> Machine Shop Inspection</p> <p><input type="checkbox"/> Reading Blueprints</p> <p><input type="checkbox"/> Toolmaking</p> <p><input type="checkbox"/> Gas—Electric Welding</p> <p><input type="checkbox"/> Heat Treatment—Metallurgy</p> <p><input type="checkbox"/> Sheet Metal Work</p> <p><input type="checkbox"/> Sheet Metal Pattern Drafting</p> <p><input type="checkbox"/> Refrigeration</p> 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(Continued from page 8)

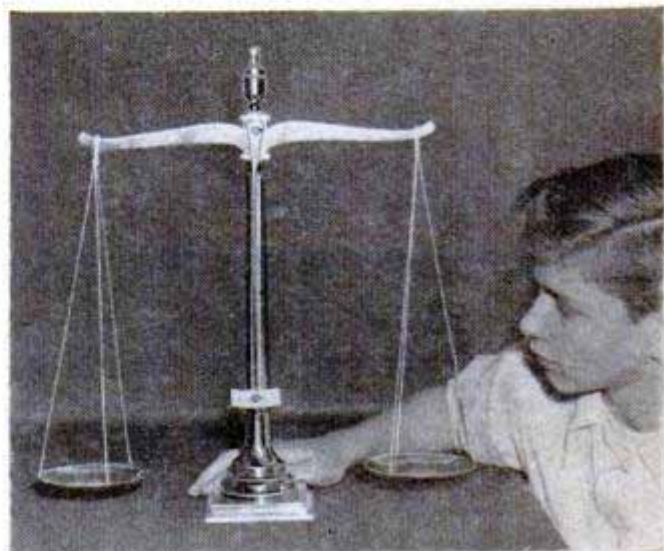
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Plans for the ornamental balances published in the April 1949 issue of *Popular Mechanics* caught the eye of Stuart W. Jeffries, Dayton, Ohio, and won for him one of the Outstanding Achievement awards in



the Ford Industrial Arts Awards contest. The specifications were followed identically except for those changes necessitated by substituting aluminum for brass.

To the Editor:

I read your article (PM, May 1953, page 119) about a four-year-old driving a small locomotive that can do eight miles per



hour. We have a son, Brad Del Bradley, two years old, who has been riding a two-wheeled motorcycle for a year. It goes 12 miles per hour.

Cecil E. Bradley,
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WHERE-TO-BUY-IT INDEX

Source of supply appears after items commercially available

AUTOMOTIVE

Gasoline engine replaces coolie power in Pakistan ricksha... 80
Mineral-removing resins soften water for batteries (Culligan, Inc., Northbrook, Ill.)... 96
Detroit Listening Post... 97
Battery adjusts capacity for winter or summer use (Willard Storage Battery Co., Cleveland 1, Ohio)... 104
Tiny German roadster weighs 300 pounds... 128
Truck boasts 41 instruments... 128
Detachable gooseneck enables one trailer to do two jobs (Hamilton Trailer Co., Box 32, Hamilton, Tex.)... 132
German Ford convertible... 132
Paint tires to match car (Park Chemical Co., 8074 Military Ave., Detroit 4, Mich.)... 137
Ground-hugging German racers powered by Porsche engines... 140

AVIATION

French barrel jet has transparent nose... 71
Slotted helmet stays on during supersonic bailouts... 71
Robot atom bombers may use ramjets... 77
Air students build replica of Wright plane... 94

BICYCLES

Adjustable Japanese bicycle folds into small package... 86
Windmill reflectors flash warning to protect cyclist (Gladden Enterprises, Inc., 3573 Kawkawlin Rd., Bay City, Mich.)... 92
Londoner puts his arms to work pumping his bicycle... 115

FARM AND GARDEN

Forked tree grubber fits hydraulic lift (Continental Mfg. Co., Box 983, Kilgore, Tex.)... 71
Tractor-mounted machine transplants 85,000 trees a day... 76
Hole digger drawn by tractor plants Hawaiian nut trees... 80
Tobacco growers protect burley crop with propane heaters (Burley Burner Co., Inc., 505 E. High St., Lexington, Ky.)... 112
Posthole digger mounted on "buggy" operated by one man (Caprara Earth Anchor Co., 1814 N. Leavitt St., Chicago 47)... 112
Pedal on spade cuts labor (Market Combers, Box 3283, Station F., Atlanta, Ga.)... 113
Three-gang mower (Worthing Mower Co., Stroudsburg, Pa.)... 113
School bus turns dump truck... 128
Out-of-line wheels keep mower level (RPM Mfg. Co., Lamar, Mo.)... 129

HOUSE AND HOME

Downspout screen (Goodmark, Inc., 21 E. 2nd St., Dayton 1, Ohio)... 86
Motorized reel of steel cable clears drain obstructions (Spartan Tool Co., 1918 Columbia Ave., Chicago)... 92
Venezuelan builds home on stilts to get shaded patio... 96
Combination dressing table-playpen serves also as wading pool (Carnagey's, 1 Central Ave., Tarrytown, N. Y.)... 104
Metallic weatherstrip applied like adhesive tape to doors (Kunkel Products, Inc., 217 Ash St., Akron 2, Ohio)... 112
Latex paint seals cellar walls (Protex-A-Cote, Inc., 161 Delancy St., Newark 5, N. J.)... 113
Wallpaper paste goes on wall to speed chore of paperhanging (Commercial Packaging Co., Hammond, Ind.)... 115
Pressure sealer (Towle Mfg. Co., Walnut Creek, Calif.)... 126
Range unit (Westinghouse Electric Corp., Mansfield, Ohio)... 126
Ice stopper (Shoppers Mart, Box 240, Fort Dodge, Iowa)... 126
Garment holder (Henry Hanger Co., 450-7th Ave., New York City 1)... 126
Range hood (Cole Mfg. Co., 705 Raymond St., Box 4103, Austin, Tex.)... 127
Clothespin bag (Hal-Rob, Dept. 16, Dayton 10, Ohio)... 127
Rack (Larry Wright Co., 420 Market St., San Francisco 11, Calif.)... 127
Wall cabinet (Kelvinator Div., Nash-Kelvinator Corp., Detroit, Mich.)... 127
Wallboard holders keep panels in position during nailing (Gypsum Ceiling Jack Co., 112-22nd St., N.E., Cedar Rapids, Iowa)... 127
Hot water generator receives heated air from furnace (Aqua-Air Corp., 1040 Hempstead Turnpike, Elmont, L. I., N. Y.)... 137
Fuel sack for small grill holds charcoal and kindling (Anna-Christine, 1746 E. 55th St., Chicago 15)... 140
Vibration detector locates wall studs (Ford Products, Box 337, Tuckahoe 7, N. Y.)... 240

PHOTOGRAPHY

Miniature exposure meter for miniature cameras... 16
Camera automatically adjusts aperture for correct flash exposure (Bolsey Corp. of America, 118-120 E. 25th St., New York City 10)... 138
Hollywood seeks "three dimension" movies without glasses... 138
High-speed motion-picture camera takes 3,500,000 shots per second... 140

RECREATION

Body harness checks golfer making faulty swing (Swingroov Co., Dumont 7, N. J.)... 76
Lilliputian Dutch city thrills "giant" visitors... 87
Junk-yard playground... 91
Plastic tripod-tee for golf ball rests on top of ground (Pee Gee Bee, 1570 Northwestern Bank Bldg., Minneapolis 2, Minn.)... 92
Boat-lift rolls into water... 125
Precut wood pictures assembled from kits (Albert Constantine & Son, Inc., 797 E. 135th St., New York City 54)... 218

SCIENCE

"Talking typewriter" records messages on magnetized paper (Pentron Industries, Inc., 644 N. Michigan, Chicago 11)... 76
Man and science conquer Mount Everest... 78
Transistors speed phone calls... 86
Body-heat "radar" detects person 100 feet away in dense fog... 86
Infrared photo plates increase power of telescope... 96
Lenses in series aid sight of many near-blind persons... 132

(Continued to page 14)




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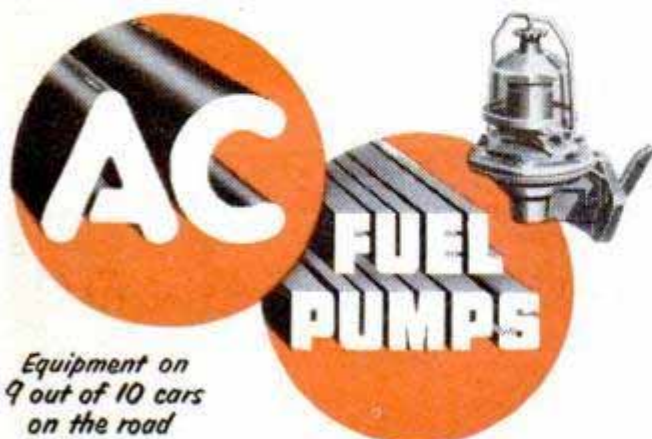
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(Continued from page 12)

TRANSPORTATION

Railroad car will sleep 40 (Budd Company, Philadelphia 32, Pa.)	103
Flint-asphalt roads	115
Rubber-tired engine runs on roadbed to switch freight cars (Fuller Mfg. Co., Kalamazoo, Mich.)	129
One-cable suspension bridge will have split roadway	137
Quick-service rail tickets	139

MISCELLANEOUS

Single column supports roof of Hiroshima mushroom library	80
Improved rifles and grenades issued to British army	96
Home, sweet bohio!	105
Canvas reservoir aids fire fighters (Harodikes, Inc., North Dighton, Mass.)	113
Pulse jets similar to buzz bombs serve as superheaters (Devenco, Inc., 150 Broadway, New York City 38)	114
Black-light traps	115
No waterwings needed with this "swimming suit" (Jack Tar Togs, Baltimore, Md.)	124
Italy's small-fry firemen show off their training	124
Curb painter (C. R. Peiffer, 4184 Baldwin Ave., Culver City, Calif.)	129
Two-way radio speeds construction	130
Color-changing paints record engine heat	162
Plastic and leather racing saddle weighs only one pound (Arcaro and Dan's Saddlery, Inc., 335 Hempstead Turnpike, Elmont, L. I., N. Y.)	133
Paint-roller attachment (Superior Paint Tools, Inc., 370 S. Hickory, Fond du Lac, Wis.)	244

Craftsman and Shop Notes Index

AUTOMOTIVE

Asbestos cement on gas line stops vapor locking	152
Use cellophane and cement to patch leaky gas tank	158
Copper ring seals connections in car oil line	160
Hose simplifies replacement of V-8 engine pistons	184
Carbon removed from car motor with hydrogen peroxide	185
Quick method of testing engine-valve seating	196
Emergency distributor repair	196

FARMING

Solenoid valve in water line controls flow to poultry waterer	185
Booster axle driven by tractor take-off provides extra power for farm trailer	185
Salt tray for livestock	189
End sections of cattle guard "fold" back to pass combine	189
Notched hinge supports scale for weighing poultry feed	196
Float arm with flexible link protected in watering tank	204

HOBBIES AND NOVELTIES

Rug tube converted to knickknack shelf	147
Shellacked book covers easily wiped clean	158
Feet for ornamental box cast from wood putty with egg-tray mold	169
Turkish towel makes "grass" for model railroad	173
Signs from scrap materials	204

HOUSE AND HOME

Curtain-rod joint taped to secure adjustment	152
Solving Home Problems	156
Anchoring recessed fixtures in bathroom wall	169

HUNTING, FISHING AND CAMPING

Hunter's small first-aid items carried in drinking cup	154
Game bags convert leather jacket into winter hunting coat	154
Permanent check list reminds campers to take everything	169
Catch fish as they feed for the winter months	172

LAWN AND GARDEN

Ornamental lamppost cast in cardboard tube	153
Brush pile burns quickly with leafy parts at edge	160
Rubber strung between branches causes "singing tree" effect	169
Screening protects young trees	189

OFFICE, SHOP AND STORE

Double-pointed carpenter's pencil for lettering price cards	154
Stop bar on office punch aligns paper correctly	158
Emergency all-purpose glue made by burning shellac	160
Putty holds glazier points	173
Self-supporting tally board speeds lumber inventory	184
Pinch bar has steel rollers for moving heavy objects	204
Vacuum cup holds brush	204
Floodlights on wooden standard provide portable trouble lamp	204

PHOTOGRAPHY

Handy data plate assures sharp photos at fast action	179
Lens shade and dust cover made from aspirin can	179
Clamp-on photoflood reflector makes table-top tripod	179
Hands dipped in photo chemicals won't become stained	180
Shelf supported by L-brackets attached to window casings	180
Card file box stores varigam filters	180

TOOLS

Small-parts storage cabinet (Akro-Mills Inc., 820 E. Market St., Akron, Ohio)	186
Calking-compound container (Colorado Steel Sash Co., 1395 S. Acoma St., Denver 10, Colo.)	186
Hollywood-bed legs (Mizim Mfg. Co., 21756 Dequindre Rd., Hazel Park, Mich.)	186
Plasterer's darby (C. D. Contracting Co., 2051 McKee Ave., S.W., Grand Rapids, Mich.)	186

(Continued to page 16)

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Air-driven rotary worktable (Mead Specialties Co., 4114 N. Knox Ave., Chicago 41).....186
Electric screwdriver (Dremel Mfg. Co., Racine, Wis.).....186
Hand portable arc welder (Royal Equipment Corp., 906 Main St., Burbank, Calif.).....187
Pickup tweezer (Win Sales Co., Box 257, Forest Hills, N. Y.).....187
Fertilizer-spreader attachment (General Mfg. Co., 2700 Karlov St., Chicago 89).....187
Handy speed-change adapter.....188
Make your own automatic punch.....197

WOODWORKING

Server for dinner appetizers made from wooden bowl.....147
Lazy Susan in marquetry.....155
Combination wardrobe and linen closet.....159
Plan of the month—sewing box and table.....170
Glass-topped coffee table from piano bench.....172

WORKSHOP HINTS

Dining-table slides hang heavy workbench drawers.....147
Sawhorse "wings" hold plywood.....152
Cutting a piece of timber.....154
Chalk line to mark plywood held by hook and clamp.....154
Additional leverage for hammer.....160
Small parts kept separated in sectional serving tray.....172
Bench stops lock cutting board.....173
Worn whisk broom cut square with saw after freezing.....173
Drilled bushing in 3-jaw chuck holds bar stock for machining.....184
Canvas covering under grinder protects lathe from abrasives.....184
Taped cutting edges on reamer prevent dulling when stored.....189
Metal scriber from drill bits.....189

MISCELLANEOUS

Child's tent erected quickly by using bucket at top.....152
Disk over brass bowl base permits attaching of felt.....152
Breaks in recording wire spliced with nylon thread.....158
Proper care and cleaning prolongs luggage life.....160
Plastic strip on crib rail protects teething baby.....173
Flagstaff at curb protected by offset pipe holder.....196
Photo visualized on page through optical illusion.....196

Radio-Television, Electronics

Color television field tests.....141
New seven seas scout has hand-wound coils.....142

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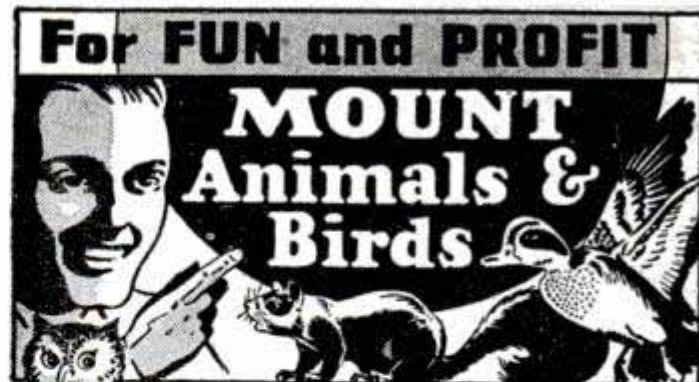
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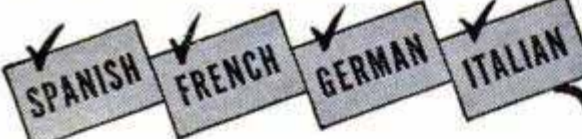
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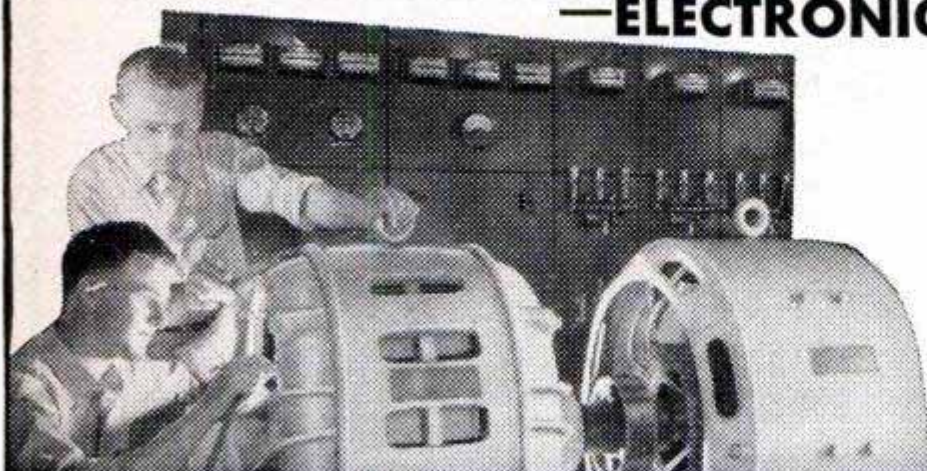
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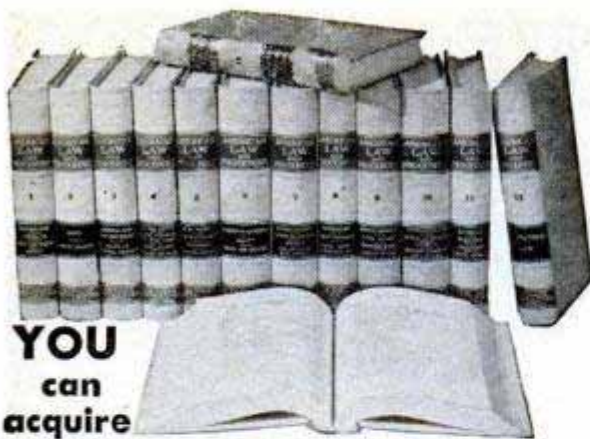
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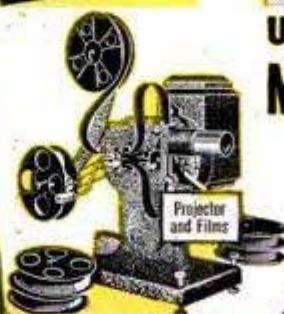
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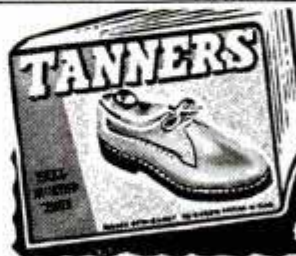
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700-16	6.42	760-15	6.02	750-15	13.92	900-20	17.22
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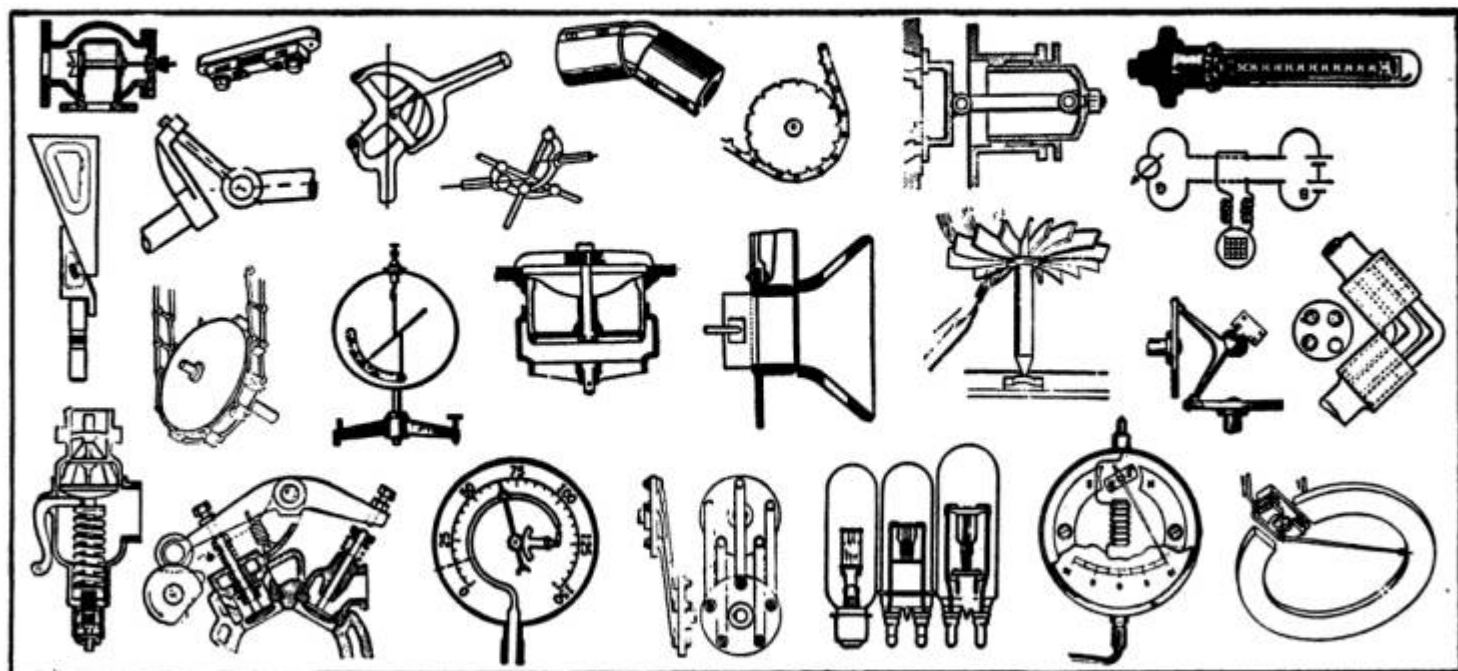
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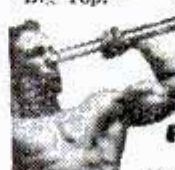
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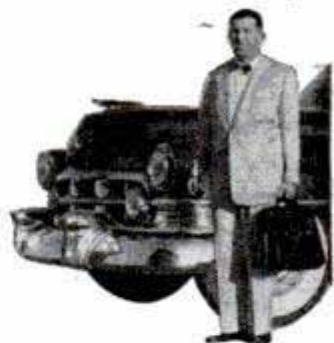
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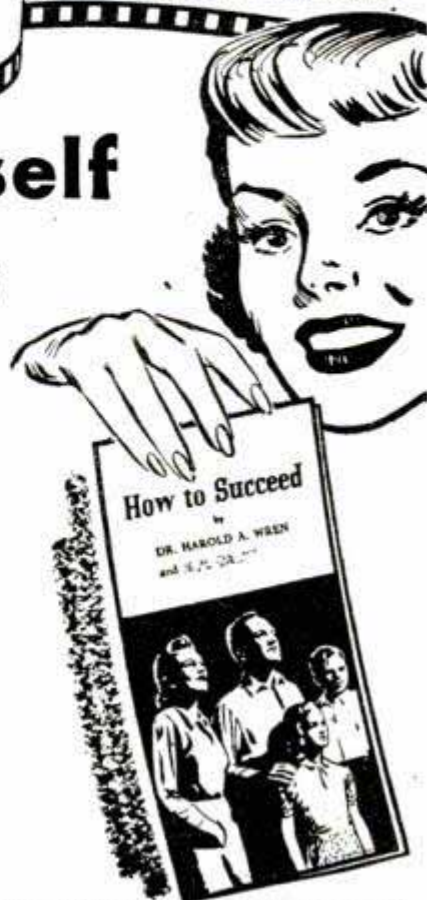
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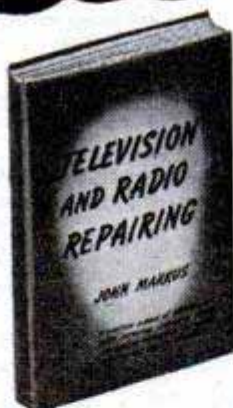
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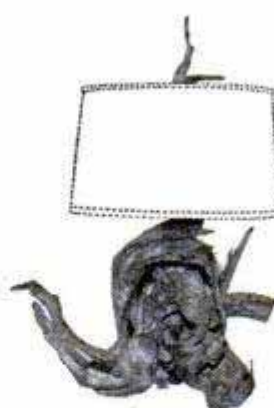
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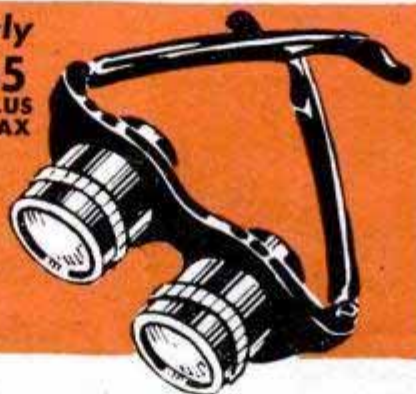
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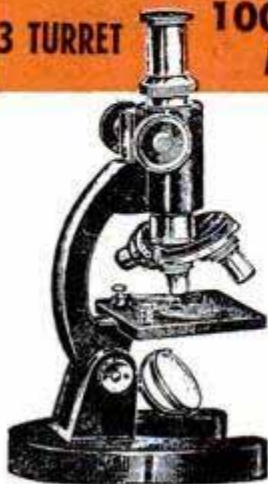


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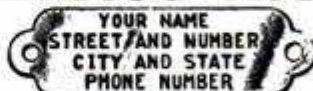
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Start on a SHOESTRING!

The real-life stories of success in Mail Order read like fairy tales. If I had not personally known these people their stories would be hard to believe. Yet they are not only true, but they represent just a few of the hundreds of "little operators" who have been swept into big money by Mail Order.

GAINES. I personally guided his start when he invented an automatic pants presser. He started with one little ad in one magazine. Four years later he retired—with enough real estate to keep him in cash income the rest of his life.

VAN MARK. I worked with him for six years. I met him when he was a wagon man for a tea and coffee house, knocking on doors. He went into Mail Order on nothing—made money from the start—ended up six years later with savings of \$50,000 and an income of \$5000.00 a year for life without further work.

DUGGAN. A few years ago he was a truck driver. Started fooling with Mail Order in a spare room in his spare time. Last year he said, "I don't know how much I'm worth—after you get the first million you quit keeping track."

MRS. NIXON. Started a small Mail Order business at home—just to keep occupied. It looked good and she came to me for advice. I showed her how to expand. In two years the business got so big her husband resigned his job to help manage it.

FOXMAN. Foxman worked as a hack writer at \$70 a week. He had idle time in the evenings—ran an ad offering something he didn't have—got so many orders he had to find a source of supply. He made \$18,000 the first year. He gives me credit for "showing the way."

JORGENSEN. Consulted me about a specialty product. On my advice he ran one ad to "test" its saleability. That ad brought sales of \$50,000. In his first year he did a business of nearly a half million dollars. His original investment was less than a thousand.

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L. W.

Have you ever thought of running a profitable little sideline right from your home? Has it occurred to you that you are just as capable as anyone else of making money on a product or service that can be sold by mail? Have you ever looked into the Mail Order business as it's run (on tiny investments) by innumerable small operators?

Forget about Sears and Ward's! Read about the "little fellows" . . . clerks, teachers, vets, mechanics, salesmen and others . . . who are packing Mail Order items in bedrooms, spare rooms, attics, garages, cellars . . . dumping them in the Post Office . . . and quietly banking the fistful of Money Orders, cash and checks delivered to them daily by the mailman.

An annual business of almost a billion dollars is done by "little fellows" who advertise and sell just one item! The Department of Commerce of the United States says, "A number of the most successful obtain incomes as high as \$40,000 to \$50,000.00."

It's an incredible story . . . a story of a business that's wide-open for newcomers . . . with opportunities for income far-and-away greater than you can ordinarily hope to attain by holding down a job. And in Mail Order you can stay as small as you wish—run your deal as a \$50 or \$75 weekly sideline—or consider jacking it up into really big figures as a full time operation.

Glance at the examples at left. These true stories are far from unusual. Multiply them by the hundreds and you begin to get an idea of what can be done . . . what is being done . . . in the phenomenal Mail Order field.

Yet, if you were to jump blindly into Mail Order your chances would be slim. A peculiar brand of "know-how" is vital in this little-known, little-understood business. This is fortunate for you. If any Tom, Dick, or Harry would "click" in Mail Order, the field would have been overloaded years ago.

But now you have the opportunity to learn the authentic secrets of successful Mail Order operation. They are revealed for the first time, step by step, in an extraordinary new Survey . . . the L.W. Confidential Mail Order Letters.

This Survey is not a course—not a book—not a group of lessons. It is a simple guide that anyone can follow. It shows you how to pick the right product for Mail Order. It shows you exactly how to start a profitable business fast, with cash or Money Orders in the envelopes you receive. It shows how to buy your product out of the very money you get in the mail, so you don't have to tie up cash in large supplies of your product. It gives you actual examples of ads and letters, analyzed to show how and why they make money. It demonstrates the months to start, the time to expand, the best way to get prospects' names. It reveals from A to Z the confidential facts that have made fortunes for Mail Order operators who use them.

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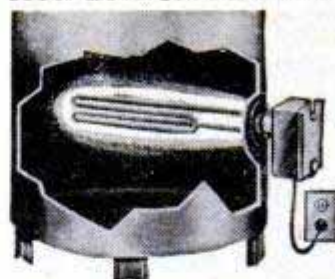
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STAMINITE Offers you a lifetime money-making opportunity selling newest, greatest discovery of world-famous chemical corporation converted into products used by every householder, hobbyist, industrial, institutional and commercial establishment in U.S.A.! Earnings limited only by your initiative and sales ability. Don't miss this opportunity! It's the biggest news in a giant, basic industry. For details write Staminite Corp., Dept. P-9, New Haven 11, Conn.

YOU Can be notary public. Information free. Magnolia Press, Box 1272-P, Burbank, Calif.

SAVE! Save! Buy merchandise wholesale! Free information. Paramount Sales, 58 West Neptune, Lynn, Mass.

OPERATE Escalator mailorder system, selling our products or any products. Fastest, most revolutionary mailorder system known. Write: Selbyco, Decatur 160, Ill.

ESCAPE Wage slavery. Easily. Operate your own profitable lifetime business. Free literature. Corley, H186 Ackerman, Clifton, New Jersey.

PEOPLE Write us they'd like to live as we do, rural, tranquil, with our home business, and money coming daily in the mail, and would we show them how? Yes. If you have capital, at least for postage and mail-order circulars, we'll get you safely started. Inquire: Craig, Southern Pines, North Carolina.

EARN Money with typewriter—Sewing machine! Details free. Edwards, 3915-PM 12th, Des Moines 13, Iowa.

BIG City employment columns. Any city \$1.00. Cunningham, 2126 R Street N.W., Washington 8, D. C.

HAND Tools—Nationally advertised. Start own business. 1000 item catalog 25c. \$3.00 6" diagonal plier \$2.00. Catalog free. Midwest Sales, 3219 W. 117th, Cleveland, Ohio.

CASH In on the coming income tax boom. Earn big fees preparing tax returns. Experience unnecessary. Details free. Union Institute, Lakewood 2-A, N. J.

EARN Amazing profits by following our instructions; selling nationally advertised watches, etc. Enclose 25c, refundable; receive multi-colored salesman's catalog and confidential price list. Result Sales Co., 580 Fifth Ave., New York.

MAKE Money sharpening saws at home, spare or full time. \$100 starts you. No selling. Free booklet tells how. Victor Foley Company, Columbia Heights, Minnesota.

HAVE Home mail business—Get \$10 orders in every mail. Keep \$8.00. Everything furnished. Hutchinson, 401-A Adams, Dorchester 22, Mass.

MODERN Formulas for many new and unusual business-building products. Literature free! Established 1897. Lipscomb Miller, Chemist, Tampa, Florida.

FREE Catalog! 50 home money-making opportunities! Maxson, Box H, Falls Church 25, Virginia.

TYPISTS Become public stenographer. Shorthand unnecessary. Unique, profitable. Free with purchase "Typewriter Profits" folio. Arnolds, Box 524a, Sacramento 3, Calif.

OPERATE Your own profitable mail-order business. Full or part time basis. Write Vernon-Hall, Box 193M, Abington, Penna.

EARN \$2.00 Hour! I do—Making sandals. Youngs, 1308-PM, South First, Arcadia, California.

WANTED! Home producers, by manufacturers in our clearing house service. Become a sub-contractor, casting plastic products for these companies. Thousands of easy-to-make items required for consumer and industrial use. Cash in at home, without previous experience. Write Plastic Service Associates, Dept. PM9, East Boston 28, Mass.

MAKE Money selling merchandise by mailing cards. Paton, Box 55-E, New York 23, N. Y.

ASK Your wife if you love your job. She knows. Then write me about the mailorder method I perfected in 1929, that's dropped \$1,000 into my mailbox every month since, that lets me stay home and enjoy life working for myself. I'll help you start. Rotoletter, 1160 Seward, Detroit 2, Mich.

WANTED! Men-women! Read how others have made big money in their own home plastics business. Spare or full time. There's still room for you. No experience or special education needed. (Also colorful liquid marble details and beautiful plastic tile sample.) Free catalog. Write today! Bing Products, PM-953, Watertown 72, Mass.

FREE Vending machines; if used to sell our profitable nuts. Continental, Box 1361-A, Milwaukee 1, Wisconsin.

START A buying service, buy wholesale thousands nationally advertised products. Make big profits selling at sizable discounts. Postcard brings details. American Buyers, 627-PM Linden, Buffalo, N. Y.

IMPORTING Is profitable. Free details. Warners, Box 6, Fort Scott, Kansas.

BOOKKEEPERS. Keep books, small firms spare time. Manual latest technique by C.P.A., \$3.00. Modern Business, Box 406, Youngstown 1, Ohio.

MAILING Postcards offering fast selling merchandise is profitable. Everything furnished. Work at home. Write, Rupnick's, 1107A West Addition Street, Martinsburg, West Virginia.

YOUR Own private business. Names, addresses of 20 firms who package cosmetics, perfumes, etc., under your own private label. 25c. Westland Sales, Box 1931-X, El Paso, Texas.

FREE Booklet—"How to Make Money by Raising Fishworms." Please include 25c for postage and handling. Flint River Worm Farm, Reynolds 5, Georgia.

MINIATURE Trees—Why pay \$2.00-\$5.00 for growing secrets? Free details. Bassett, Dept. B, 5038 N. Winthrop, Chicago 40.

WE Pay \$5.00 for some names. Make steady income sending us names. We buy thousands. Details 25c coin. Pacific, Box 73136, Los Angeles 3.

BUY Wholesale—Thousands nationally advertised items. Save, make money! Free details. Durex Co., Box 672-B, Chicago 90, Ill.

SELL Guaranteed children's amusement to babysitters, provable instructions, \$1.00 refundable. Controller, 1009 S. First, Champaign, Ill.

MONEYMAKING OPPORTUNITIES

SELL Titania gems; \$9.75 carat wholesale. More brilliant than diamonds. Free catalogue. Diamonite, 1404-M Mitchell, Oakland 1, California.

50,000 ARTICLES Wholesale. Source directory, dime. Nelko, Box 3462-DR, Chicago 54.

WIN Contest money. General Contest Bulletin gives hundreds of tips. Lists current contests and rules. Sample 25c. General Contests, 1609½ East 5th, Duluth, Minnesota.

MONEYMAKING Deluxe opportunity packet. Only 10c. Don Supkow, Blackwood, N. J.

EARN \$2,600 A year working hour a day at home! Free booklet. A. O. Co., 442 N. Seneca, Wichita 12, Kansas.

FOUR Ways to increase your income at home. Free details. Dixie Mailers, King, N. C.

SCHOOL Seniors—Sell classmates America's most beautiful graduation name cards. Largest selection. Highest commission. Outsells all others. Free sample kit. Printcraft, Dept. M, 1509 Maple Street, Scranton 5, Penna.

MONEY Found. Be our agent in your community. Top quality watches, diamonds, jewelry, etc., at wholesale prices. Amazing profits. No age limit. Experience unnecessary. Send for free catalog. Zerah Brothers, 602 Mission Street, Dept. 81, San Francisco 5, Calif.

START A profitable subscription business in spare time! We need men and women (young or old) as representatives for all leading national magazines. Liberal commissions paid for new and renewal subscriptions. Start earning money in this pleasant work at once! Clip this ad and send with your name and address to: International Circulation Distributors, Dept. PM, Hearst Magazines, 250 W. 55th St., New York 19, N. Y.

FREE Book "505 Odd, Successful Businesses." Work home. Expect something odd! Pacific, Oceanside, Calif.

READ Progressive Mailtrade, the magazine that tells how to make money by mail. Dime brings sample and special offer. Progressive Mailtrade, Box 357, Sheboygan, Wisconsin.

137 PLANS To make money, local mail-order. Details: Elite Co., 220 Grand St., New York 13.

INSTALL Hand railings on stairs, terraces, porches. Unlimited applications. Provides safety. Cast aluminum universal joints lock with set screws. 1½ inch aluminum tubing will not rust. Easy to assemble. Fits any angle or grade. Install in wood, stone, ground or concrete. Profitable. Send for folder. Kloppenborg Aluminum Foundry, Dept. PMC-3, Davenport, Iowa.

PUBLISH Your own magazine. Hand-some 52 page format, well edited, illustrated. Cost low as \$1.00 month. Brings you prestige, profits. 25c brings sample, details. National, Ord, Nebr.

DON'T Be Mr. Average man. Operate your own business. New field, sensational sales potential, highly profitable. Very desirable, non-perishable, no chemicals or liquids. High-grade proposition for men not afraid of earning \$10,000 and up annually. Can you recognize real opportunity? Postcard will bring details. Box #543, Oak Park, Illinois.

START A buying service, buy wholesale thousands nationally advertised products. Make big profits selling at sizable discounts. Postcard brings details. American Buyers, 630-PM Linden, Buffalo, N. Y.

BUY Wholesale nationally advertised jewelry, electric appliances. Sell direct from free retail price catalog with confidential wholesale price list. Tremendous profits. Invest no money. Louis Perloff, Dept. PM, 733 Walnut Street, Philadelphia, Penna.

BORROWED \$45 For stamps and circulars. To date sold quarter million dollars, in small orders! All from home, by novel mailorder method where we supply circulars to mailers in certain key positions. Orders come automatically, average \$40 daily. Now we're showing others how. Details: Hometrend, 402 S. Eighth, Marshall, Illinois.

SCHUHMACHER Matmakers. Convert old tires into dollars. Devote full or spare time. S and S Patents, Inc., 1307 North Clark St., Chicago 10, Ill.

CHURCHES, Clubs, organizations, receive \$130, 12 card tables free. Unique Club Plan, Pine Hill, New Jersey.

MONEY Needed? Start home business. Grant Specialties, 721 28th, South Bend 15, Indiana.

PAUZE Liquid styptic stops bleeding quickly. Fast profits. Sampler 25c. Pauze, 1545-F Echo Park Ave., Los Angeles 26.

MONEY Making offers in mail order. Bert McPherson, PM9, Selah, Washington.

FREE! 60 Wholesale catalogs free! Sherry, P.O. Box 11, Miami 37, Florida.

HOW New "Geometric" mailorder operates: Take something to sell new car owners; let car license clerks over nation distribute your circular. They welcome extra money; you reach vast numbers. Works fast. Many uses. I sell legal supplies this way. \$250,000.00 so far! "Geometric" information free. Specialty House, 910 E. Main, Danville, Illinois.

MAILORDER—Operate profitable home business using free advertising method reaching millions. Revealing information free. H. F. Seidel, 7070 Hollywood Blvd., Hollywood 28, California.

WINNING Prize contests is fabulous, confidential home opportunity! Send stamp! National Contest Bulletin, Box 2685-P, Miami 16, Florida.

HONEY Of a deal. Weatherstrip brokerage. E-Z-On, 1009 Harvard, Evanston 11, Ill.

HOW To earn up to \$500 for each script writing for television. New, different. Particulars free! Wonderful Products, Box 2113, Santa Fe, N. M.

22 MILES Out of city I live, yet walk to work daily, to my office, a renovated barn 50 feet away! I planned it that way. We organized a home mailorder, a rare kind, branch-style. United States Postal Service approved. Grosses \$1,000 monthly. Organization duplicatable using other products. Inquire: Kerr, Gering, Nebraska.

FREE Information reveals secrets of unusual profitable home businesses. Rare opportunity. Home Business Surveys, 365 S. Fairfax, Los Angeles 39, Calif.

MAKE Cosmetics in your kitchen for own use or to sell. Easy, profitable, not seasonal. Ingredients available at drug stores. Twenty one formulas and instructions \$1.00. Moffet, 429 N. Gilbert, Danville, Illinois.

EARN Money, spare time, homework. Free literature. Wiese, 1516 Franklin, Waterloo, Iowa.

MAKE Money at home by mail. Fast, easy. Liebig Industries, Beaver Dam 4, Wisconsin.

FOREIGN Employment construction work. If interested in foreign projects with high pay, write Foreign Service Bureau, Dept. PM, Metuchen, New Jersey.

FREE Booklet reveals amazing secrets behind 301 new profitable enterprises! Many mailorder! Includes confidential instructions for starting wholesale buying service. Deumant Business Surveys, 83-PM Deumant, Kenmore 23, N. Y.

\$10,800 PROFITS! Your own mailorder business! No capital risk! Success plan (worth \$2) free! Write today! Treasury, 709 Webster, New Rochelle PM-15, New York.

BE Independent, be secure, have your own profitable business—Earn \$20.00 and more a day making beautiful, fast-selling lamps at home. No equipment needed. Illustrated course teaches you quickly. Course, parts catalog, wholesale price list—only \$2. Gearon Co., Dept. 200-B9, 27 S. Desplains, Chicago 6, Ill.

BE Notary public. Rate higher. Details free. Stationers, Helotes, Texas.

EXCEPTIONALLY Profitable home mail business opportunity. Write, Lewis Bartlett, Richland, Georgia.

BEAUTIFUL Feather pictures. 200% profit! Free sample. Apartado 9036, Mexico 1, D. F.

400 RADIO Stations active. Free radio advertising. Pay commission only on orders received. Free information. Mishek, 2, Waseca, Minn.

MAKE To \$4.50 hour doing common pen lettering. National Artists, 801½-A North Marsalis, Dallas 3, Texas.

BIG Profits in photostamps. No investment! Free information. Hoffman, 284P Madison Street, Passaic, N. J.

SECRETS Of money making. Write Ahrens, Box 41, Roosevelt, New York.

\$5.00 PER Hour manufacturing driftwood lamps. Sam Patchett, 2187 N.W. 24 Court, Miami, Florida.

"MONEY-Making for the Millions." Discloses how you or anyone, anywhere, can have happier, better living. Write for free details. Merit Mail Order, Montrose 1, Mo.

DOUBLE, Triple, quadruple your income. Free information. Future Foundation, Pensacola 2, North Carolina.

CASH In on the demand for amazing Rainzip coverall with parka. Bonus offer. No investment. Details free. Sample \$3.50. Gardinerb, Sharp Bldg., Kansas City, Mo.

FREE! Complete mailorder business! Terrific profits! No investment. Write today. VitaMins, 2908-PM, Beverly Boulevard, Los Angeles 57.

BECOME Notary public. Big earnings. Send \$2.00. Sterling, Great Neck 55, N. Y.

FORMULAS, PLANS, ETC.

FORMULAS: All kinds. Latest, best. Literature free. Kemixal, Park Ridge, Ill.

REAL Manufacturing formulas. Lists free. Cummings, Chemist, Gordon Ave., Syracuse 4, N. Y.

ANY Formula \$3.00. Chemical Instruction Sheet—catalog 10c. J. Belfort, 216 W. Jackson, Chicago 6.

FREE Formula catalog. Anything analyzed \$35. Western Chemical, Salem, Ore.

PRODUCT Analysis, manufacturing formulas, processes developed. Moderate fees. Plastics, Box 1574, Boston 4, Mass.

LABORATORY Tested formulas. Catalog free. Pont Chemical Company, Terre Haute 2, Indiana.

MODERN Formulas for many new and unusual business-building products. Fifty years supplying the best. Literature free! Liscomb Miller, Chemist, Tampa, Florida.

500 MONEY Making formulas, 25c postpaid. Allen, Dept. PMC, Clinton, Missouri.

ANY Formula. Jack, Consulting Chemist, 5138 Gainer Road, Philadelphia 31, Penna.

GENUINE Manufacturing formulas. Latest. Literature free. Nelko, 3462-P Merchandise Mart, Chicago 54.

PLASTICS

PLASTICS—Lucite, Plexiglas, Acetate, Vinylite, Polyester-Fiberglass. Low, low prices. Value-packed, bargain-filled catalog 10c. Airmailed 25c. Gem-O'-Lite, Box 6864P, North Hollywood, California.

PLASTIC Sheets, rods, tubes, etc. Free list. Plastic Supply Co., 2901 N. Grand Blvd., St. Louis 7, Mo.

PLEXIGLAS Sheets—Cut to size. Clear. All thicknesses. Standard outdoor translucent colors. McClarin Plastics, P.O. Box 168, Hanover, Penna.

LUCITE, Plexiglas. Any size sheets, masked. Square foot (12 x 12) cost, 1/16", \$1.20; 1/8", \$1.40; 3/16", \$1.75; 1/4", \$2.08. Include 10% postage. Almac Plastics, 600 Broadway, New York City.

PLASTICS Home-craft course for men and women. Tells and shows how to make hundreds of fast selling plastics products. All plastics and materials for 23 projects included in course. No special tools needed. Course pays for itself. Write for free booklet. Interstate Training Service, Dept. D3J, Portland 13, Oregon.

NEW Liquid casting plastic. Clear, colors. Embed flowers, insects, coins. Saw, drill, carve. Send 25c for Castolite Creations Manual and proved success plan showing how to make money at home. Castolite, Dept. K-101, Woodstock, Ill.

POLYESTER-Fiberglass materials in any quantity for boat coatings or auto bodies. Van Horn Plastics, 1905 Ingersoll, Des Moines, Iowa.

ENGRAVE Plastic titleplates; new "Dupliscale" engraving, carving machine. Earn profits to \$5 hour! Details, sample 25c. Desco Distributors, 6334-X Sepulveda, Van Nuys, Calif.

DIRECTORY Of manufacturers, for liquid plastics, liquid rubber, wholesale. Castleco, 2139P, Paterson, New Jersey.

CHEMISTRY

CHEMICALS And apparatus for industrial, analytical, and private laboratories. Catalog 25c. Dept. M-50, Biological Supply Co., 1176 Mt. Hope Ave., Rochester 20, N. Y.

ILLUSTRATED Catalog: Chemistry, mineralogy, biology. 10c. Tracey Laboratories, Evanston, Illinois.

NEW Idea chemical and apparatus outfits for home experimenting. Photo-scales, microscopes, chemicals, biological and laboratory supplies in small quantities. Catalog 25c. Established 1931. John H. Winn, 124A West 23rd Street, New York, N. Y.

SPECTROSCOPE For quick chemical analysis \$3.00. Kutting Sons, Los Altos, Calif.

COMPLETE Catalog, 15c, surplus lists. Laboratory Sales, Box 161-A, Brighton, Mass.

IMPROVED Second printing, spectacular chemical fireworks experiments manual. Not mimeographed sheets. Contains complete formulas, set-ups, data, on thermites, fulminates, explosive powders, etc. Still \$1.00 postpaid. Chemi-Technix Laboratories, 568CF Riley, Buffalo 8, N. Y.

AMAZING New book of science. Experiments, formulas and catalogue of laboratory supplies. Only 25c. National Scientific Co., Dept. 16, 2204 W. North Ave., Chicago 47, Illinois.

AGENTS WANTED

NEW Plastic mending tape. Just press on! Repairs clothing instantly. Lightning seller. Samples sent on trial. Kristee, 178, Akron, Ohio.

\$200 WEEKLY. New invention. Amazing 4-second Presto emergency tire chains. fit all modern auto wheels. National advertising building big demand. 3 sales daily to oil stations, dealers, etc., make \$200 or more weekly. Territory going fast. Write Presto Chain Co., Dept. P-24, Des Moines 2, Iowa.

WHOLESALE Catalog. Nationally advertised appliances, watches, etc. Send today for free catalog. Carroll Distributors, 4421 Snyder Ave., Brooklyn 3, N. Y.

PRINTING. Salesbooks, envelopes. Free illustrated catalog. Ersco, Dept. PM, Bronx 72, N. Y.

GOLD, Silver lacquered letters. Wind-dows, doors, trucks. Standard sizes. Penny and up. Big profits. Samples. Atlas-D, 544 West 79th, Chicago 20.

MAKE Extra money. Sell front door name plates to friends, neighbors. Retail \$1.98; you make \$1.00! Free selling kit. Modern Engraving Co., P.O. Box 194, Boston 14, Mass.

ABSOLUTELY Free—Sales kit. Yours for the asking. Send postcard today requesting kit showing new line, belt buckles with your name or personal initials, cap badges, choice 3000 different emblems. Write Hook-Fast, Box 1425PM, Providence, R. I.

YOUR Own business—Used suits \$1.50, overcoats 65c, mackinaws 35c, shoes 12½c, ladies coats 30c, dresses 15c. Enormous profits. Catalog free. Moro, 558-AA Roosevelt, Chicago 7.

CALIFORNIA Sweet smelling beads. Sensational sellers. Free particulars. Mission, 2328PM West Pico, Los Angeles 6, Calif.

AGENTS: Stamping names on key protectors. Sample 25c. Stamping outfits, checks, social security and name plates. Hart Mfg. Co., 303 Degraw St., Brooklyn, N. Y.

AGENTS—300% Profit selling genuine gold window letters; stores and offices. Free samples. Metallic Sign Letter Co., 431-D North Clark, Chicago.

EXCELLENT Sideline for printing and advertising salesmen. Decalcomania name plates in small quantities. Great demand. Also, make money with our line of automobile initials and sign letters. Free samples. "Ralco" XL-Roxbury, Boston 19, Mass.

\$50 WEEKLY Selling finest razor blades, other items. Free details. Edisons, Box 274, Far Rockaway, N. Y.

150% PROFIT Demonstrating amazing new perfumed waterless hand cleaner. Write, Hill Sales Co., Waynesburg 8, Penna.

\$1.00 PROFIT Selling \$2.95 photo enlargement deal. Allen Studio, Riegler Bldg., Little Rock, Ark.

WHOLESALE Catalogue! Nationally advertised appliances, cameras, watches, etc. Cam Company, 1717PM—58th St., Brooklyn 4, N. Y.

SHINE Shoes without polish. New invention. Lightning seller. Shoes gleam like mirror. Samples sent on trial. Kristee 121, Akron, Ohio.

JUST Out! New thrilling sensation in Christmas cards. Make big money! Show luster foils, satins, brilliants. Amazing values bring easy orders! Magic Glo-in-the-Dark ornaments, personalized stationery, matches. 30 free samples. With name 50 for \$1.50. Several \$1.00 boxes on approval. Joy Greetings, 507 N. Cardinal, Dept. 60-M, St. Louis, Mo.

NEW Profit builder for Xmas card and other direct agents. Amazing Glitter pen kit decorates any surface in 6 dazzling colors. Easily sold for personalizing and decorating Xmas cards, Xmas stockings, gift packages, ribbons, scarfs, candles and 100 other items. Special offer—Send \$1.00 for 2 kits, retail \$1.00 each. Money back guarantee if not delighted. Glitter Sales, Dept. 24, Montclair, N. J.

AGENTS—Show America's leading nationally advertised line—Novelties, gifts, utility items. 100% profits. Prospects everywhere. Steady repeats. Write today for sensational low prices, free literature. Charms & Cain, 407-PM-93 South Dearborn, Chicago, Ill.

SCHOOL Seniors—Earn sensational profits selling classmates America's most beautiful graduation name cards. Largest selection. Outsell all others. Free sample kit. Printcraft, Dept. M, 1509 Maple Street, Scranton 5, Penna.

SENSATIONAL High quality, low priced retractable ball pen, permanent ink. Extra refill free. Fast, profitable seller. 60c per sample refundable on first dozen order. Lucar Trading Co., 225-A Lafayette St., New York, N. Y.

AMAZING Money making offer—\$50 or more selling 100 boxes America's leading Christmas cards. Samples on approval. Complete line. Free samples personal Christmas cards and stationery. Sensational bonus. Write, Lorain Art Studios, Dept. 113, Vermilion, Ohio.

BIG Profits selling ties. (\$2.00 values). \$6.50 dozen. Free catalog. Empire Cravats, 611A Broadway, New York 12.

MAKE Christmas money at home. Take renewals and subscriptions for all magazines. Big Christmas profits now. Liberal commissions. Everything furnished. Free catalog. Write McGregory Magazine Agency, Dept. 500 A, Mount Morris, Ill.

SHOW Friends life-like Christmas, all occasion, children's greeting cards, wrappings, gold imprinted items. Big profits. New type bonus-premium reward. Write for feature samples on approval, free sample name imprinted Christmas cards, exclusive stationery, free color illustrated catalog, selling guide. New England Art Publishers, North Abington 933-B, Mass.

SENSATIONAL Bargains—Profits! Used suits \$1.75, pants 35c, dresses 20c, shoes 20c. Operate from store, home, car. Free catalog. Superior, 1250-A Jefferson, Chicago 7.

MAKE Money selling ties. Buy direct from manufacturer. Write to Philip's Neckwear, 20 West 22nd, Dept. 244, New York.

BEST Source for wholesale nylons. 25 years dependable service. Fields Hosiery, 99-G Chauncy, Boston, Mass.

MAKE \$1,500 Sparetime, showing leading lines of men's shirts, underwear, ties, men's-women's hose. Send 10c today for beautifully illustrated, 20 page catalog. Wolfmark, 931 Roosevelt, Chicago.

MAKE Money introducing world's cutest children's dresses. Big selection, adorable styles. Low prices. Complete display free. Rush name. Harford, Dept. K-3341, Cincinnati 25, Ohio.

TRIM Hair without barber. Miracle clipper sells on sight. Keeps hair neat. Samples sent on trial. Kristee 123, Akron, Ohio.

RUN A spare-time greeting card and gift shop at home. Show friends samples of our new 1953 Christmas and all-occasion greeting cards. Take their orders and earn up to 100% profit. No experience necessary. Costs nothing to try. Write today for samples on approval. Regal Greetings, Dept. 96, Ferndale, Michigan.

NEED Money? \$50.00 yours, sell only 100 boxes new Christmas cards. Other amazing offers. Free samples imprinted cards. Feature box assortments on approval; free catalogue, 100 profitable items. Work with a national leader. Write today. Pen-N Brush, Dept. PM; 139 Duane St., New York City 13.

MAKE Fabulous profits in jewelry. Proven tested items. Deal direct. Free details. Write Azco Company, Dept. 1, 725 Sansom Street, Philadelphia, Penna.

AT Last! Something new and sensational in Christmas cards. Make extra money fast! Show satins, velours, metallics. Gets easy orders. Pays up to 100% cash profit. 30 free samples. With name 50 for \$1.50. Big line. Amazing new Glo-in-the-Dark ornaments, personalized matches, stationery. Several \$1.00 boxes on approval. Puro Greetings, 2801 Locust, Dept. 340-L, St. Louis, Mo.

DROP Everything! Sensational earnings now to Christmas with fastest-selling, popular-priced personal Christmas cards, name-imprinted. Also album of deluxe designs. Box assortments too. Send name for samples. Wallace Brown, 225 Fifth Ave., Dept. F-4, New York 10, N. Y.

AMAZING Profits selling exclusive Sunshine Christmas cards: Nature prints, scripture text, imprints, nationally famous. 21 for \$1.00 assortments all sell on sight! Many others! Also gift wraps, stationery, etc. Send for samples on approval. Sunshine Art Studios, Inc., Dept. PM-9, Springfield 1, Mass.; Pasadena 3, California. (Note: East of Rockies address Springfield office.)

MONEY For Xmas. Make at least \$50 showing beautiful Elmira Christmas and all-occasion greeting card assortments—Name imprinted Christmas cards, stationery, napkins, book matches, playing cards. Gift wraps, books, games, household, hostess items. All unbeatable values. Make money while you make friends. No experience necessary. No risk. Send no money. Free samples, catalog. Bonus plan, display assortments on approval. Write today! Elmira Greeting Card Co., Dept. C-175, Elmira, N. Y.

BRAND New! Amazingly different and smart Christmas cards bring you big money! Take easy orders fast! Pays up to 100% cash profit. With name 50 for \$1.50. Big line. Sensational Glo-in-the-Dark ornaments, personalized stationery, matches. Several \$1.00 boxes on approval, imprints free. North Star, 31 Glenwood, Dept. 18-M, Minneapolis, Minn.

AGENTS-Salesmen: Sell beautiful hand colored plastic enlargements and sensational new personalized photo compacts, rings, bracelets, lockets, etc. Experience unnecessary. 40% advance commissions. We deliver, collect. Wonderful sideline—Better full time. Free sample outfit. Novel Portrait Co., 3343 North Ave., Chicago, Ill.

MEXICAN Feather pictures. Sell on sight; 200% profit! Free details. Sample 20c stamps. (No coins.) Sylvia-P, Apartado 9036, Mexico City.

MAKE Your dreams of success come true! We can show you how. Sell direct exclusive Spring-Step cushion shoes—A new idea in foot comfort. Earn up to \$25 daily! Full or part time. Free sales equipment! Write today! Dept. PM-93, Ortho-Vent Shoe Co., Salem, Va.

BALL Pens \$10.00 gross, d.e. s.e. blades \$4.20 M, novelty flashlights with batteries \$2.25 dozen, assorted ruffled plastic aprons \$1.40 dozen up. YoYo Tops \$12.00 gross. Lutzker, 871-JA East 170th, New York City 59.

TWO In one screwdrivers, sample 88c net. Money maker. Ideal Service, Box 8637, Oklahoma City 14, Oklahoma.

EASY Handwork makes fast-selling useful articles. Sample free. Sunmade Company, Brockton 64, Massachusetts.

MAKE Money spare time plus new car as encouragement bonus. No house-to-house canvassing required. Amazing 60 gauge nylons, 3 pairs guaranteed 3 months or replaced free. Write Wilknit, 1739 Wash., Greenfield, Ohio.

SELL Simulated engraved business cards. Profitable! Gooch, 202PM, Hernando, Miss.

TELE-Pep (TV) unit. On Mexican stations, \$2.95. Sensation. Smith Agency, PMV, Excelsior Springs, Mo.

3 FOODBAGS Free just for examining America's finest plastics. Over 200 fast-selling household items—Dishware, drapes, giftwares. Take orders, earn big money. Catalog free. Loraine, 846-G Adams, Chicago 7, Ill.

FOR Opportunity of lifetime see Stamp-inite advt. Business Opportunities column.

MAGAZINE Agents. Biggest commissions. Bonus. Qualified Publications, 451D Kingston, Brooklyn 25, N. Y.

EUREKA! Sell inscribing goldfoil! Five 50c packs, \$1.00; dozen, \$2.00. Arndt, 1017-PM Bay, Eureka, Calif.

POWER Mowers. New-used. Warehouse clearance. Wholesale deal. Farm Products-PM, Excelsior Springs, Mo.

MEXICAN Feather pictures. High profit! Fast sellers! Adelphi, Box 57-B, Bellerose 26, N. Y.

'54 WHOLESALE Dealer kit on appliances, typewriters, recorders, cameras, giftware, lighting fixtures. Free. Write Arrow Distributing, 154K, Nassau St., New York City.

ONE Hour a day can bring you \$500 or more for Christmas. You can have extra Christmas money simply by showing Fannour's nationally-known line to friends and neighbors. Everyone wants Christmas cards, stationery, notes, napkins, children's items, gifts. Folks just like yourself with no experience at all easily earn \$500 in just one hour a day with Fannour's 100% Profit Plan. Free imprint samples. Selling outfit on approval. Write today! Free! Organization fund-raising plan. Fannour, Dept. PM-2, 200 Fifth Ave., New York City.

BUY Wholesale from nationally advertised manufacturers, distributors. Literature free. Carter Publications, Box 6011-B, Chicago 80.

BUY Wholesale thousands nationally advertised products at big discount. Free wholesale plan. American Buyers, 631-PM Linden, Buffalo, N. Y.

FREE Nylons! Men and women wanted to introduce amazing nylon stockings (guaranteed against runs and snags) by giving away free trial pair to every woman regardless whether or not final purchase is made! Earn up to \$3 an hour spare time. Advance cash plus 40% bonus. Postcard brings you free sample stocking and moneymaking outfits. Nothing to pay now or later. No obligation. Kendex, Babylon 43, N. Y.

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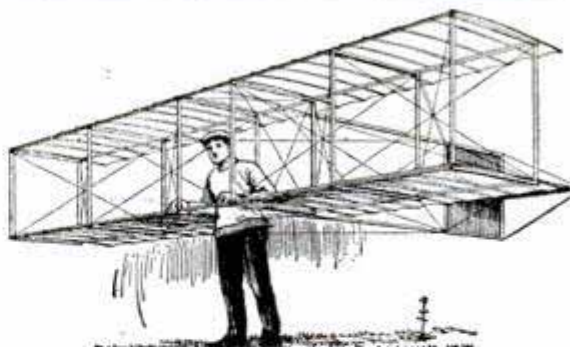
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Looking Backward...

has been a habit with us lately. We marked our fiftieth anniversary, and noted that we were still leading our particular field—a field in which we were the pioneers in 1902 with a 5-cent weekly that just grew and grew. We were in on the threshold of the Air Age—by 1907 we were telling eager readers how to build and fly their own gliders. Many of them cut the spruce frames, covered them with cambric or unbleached muslin and braced them with No. 16 piano wire. Later they proudly sent us photographs taken as they leaped from a country hillside and glided a few hundred feet over the meadows.

THEN, AS NOW . . .

Looking back, one might say that a magazine dedicated as was *Popular Mechanics* to reporting civilization's greatest technological advances in a fresh, simple, pictorial fashion could not help but succeed, for its beginning almost precisely paralleled the awakening of America to the practical uses of science. The period of the magazine's growth coincided with the development of the automobile, the airplane, radio and television, motion pictures, X-ray, atomic energy . . . with the creation of a vast array of machines, engines, appliances, gadgets to lighten labor and make for better living. Then, as now, *Popular Mechanics* was a particularly faithful mirror of our times.

HOW FIVE BOOKS GREW FROM ONE

We found that if we just went over the back issues, selected the most significant pages and reproduced them with some marginal comment, we would have an excellent record of the past half-century. We published it as *Fifty Years of Popular Mechanics*. Thousands bought it, and many wrote us of the heartwarming memories it brought them.



But we found we had tapped a vein richer in history than we thought. The material we found cried out for another book, *Popular Mechanics' Picture History of American Transportation*. After months of research and picture gathering, we had the story of transportation from the birch-bark canoe to the jet airplane, and also covered the other forms of transportation. We took another look, and found that without duplicating the other books, we could produce *Popular Mechanics' Auto Album*, which is now in its second printing, and *Popular Mechanics' Aviation Album*. Finally, we are preparing *Popular Mechanics' Railroad Album*. It will be released this fall.

IF YOU'D LIKE ANY ONE . . .

These books are available at any retail bookstore. *Fifty Years of Popular Mechanics* and the *Picture History of American Transportation* are \$5 each. *Auto Album* and *Aviation Album* are \$3 each, and this will be the price for *Railroad Album* also. If you would like your name or someone else's name imprinted in gold on the handsome cloth covers, you should obtain your copies by writing

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By John M. Mason

What a fellow makes in his regular job today is hardly enough to make ends meet. Higher taxes, higher costs of food and rent and almost everything else raise hob with the savings account. And I say that what a fellow puts away is even more important than what he makes. It would worry me sick if I couldn't save a little against a rainy day.

And that makes it almost necessary to make some extra money. There are lots of ways to do it, too. The magazines and newspapers are full of ads for agents to sell things. But if I had to make a living by selling, from house-to-house, I'm afraid I'd starve to death. I like to make something with my hands and either sell it by mail or let the stores sell it for me. There are lots of people like me.

Another thing: Lots of men—and women, too—don't want to get mixed up with something that might hurt them on their jobs. They want a plan they can operate at home—in spare time—one that they can work at any time they please and one that doesn't need any rented store or hired help. And that's where my little money maker rings the bell.

Let's say you're like me. You want to make some extra money but you don't want to do any selling. All right—take a look at what you can do with this machine. I'll give you some facts that I discovered and your own common sense will tell you they're true.

If you're going to make something, it ought to be something that lots of people want—something that lots of people buy. It shouldn't be something that sells at just certain seasons—but all year 'round. And, it shouldn't be any flash in the pan. It's got to be steady—year after year—something that's not here today and gone tomorrow.

Well, give a thought to this: What's more permanent than babies? Ever since I can remember there's been more and more babies born every year. Last year three and a half million. This year more. Next year, more yet. Then answer this question and tie it in with your thinking: What's stronger than mother's love for her baby? And what is more powerful than love or sentiment in making people buy things. Now you've got the idea.

Every year millions of mothers want their babies' first

shoes preserved as mementos. These mothers have the shoes "bronzed" as they call it—by electroplating. Electroplating coats the shoes with copper and preserves them forever. And there's no big company that has a corner on the business of metalizing baby shoes. Almost all of this work is done by little fellows in their kitchens or basements. Lots of orders come to you by mail when you send out circulars letting mothers know you can do the work. Lots of stores take orders, but they have to turn over the work to you. There are six or seven ways to get orders without making any house-to-house calls. The big job is keeping up with them.

You see, you can clean up six pair of shoes in a few minutes. In a few minutes more you can dip them in the hardening solution like you see in the picture. Then you spray them with a conductive coating and hang two pair in the tank on copper wires. Just turn the switch and walk away. The machine does the rest. Eight hours later those shoes are ready to take out of the tank, burnish and mount and ship or deliver. Two pair every eight hours, whether you are asleep, awake or at the movies. The materials cost 54c a pair. The retail price you get for electroplating is \$6.00—so the profit is more than \$5.00 a pair. Since you can do six pair a day you can see what the profit is, and the beauty of it is that the machine doesn't cost much. Almost anyone can afford the equipment and the book you get tells how to run the machine and how to get orders. Anyone can follow the instructions.

Of course, there's a lot more information than what I can give here. But write me a note or send me a postcard with your name on it and I'll send you all the information right away by mail. I'll show you how to start; what you need to buy; where to get it at the lowest price; how to get orders coming in seven different ways; and everything you want to know about the business. When you get all the facts, you can decide whether you want to get a "little money maker" of your own. Everything I send you now is free—no charge and no obligation. I'll be glad to help you get a start. Address me, John M. Mason, 1512 Jarvis Avenue, Chicago 26, Illinois. There's no catch to it. No one will call to try to sell you anything. I'll mail everything free, postage prepaid. Then you can decide. Write to me right away so I can help you get started making money.

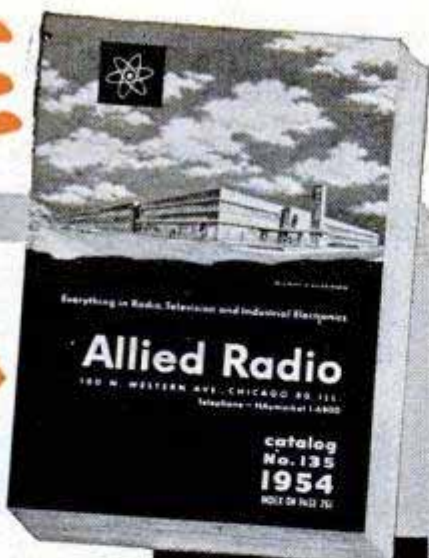
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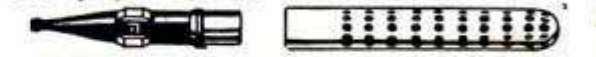
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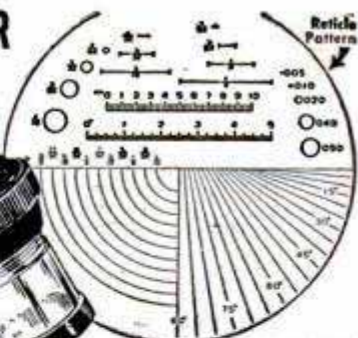
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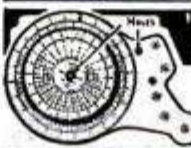


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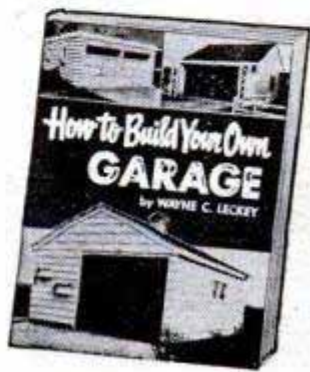
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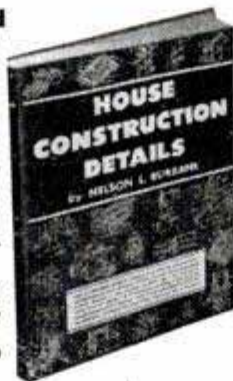
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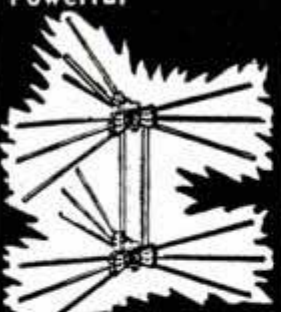


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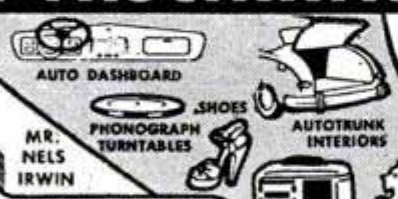
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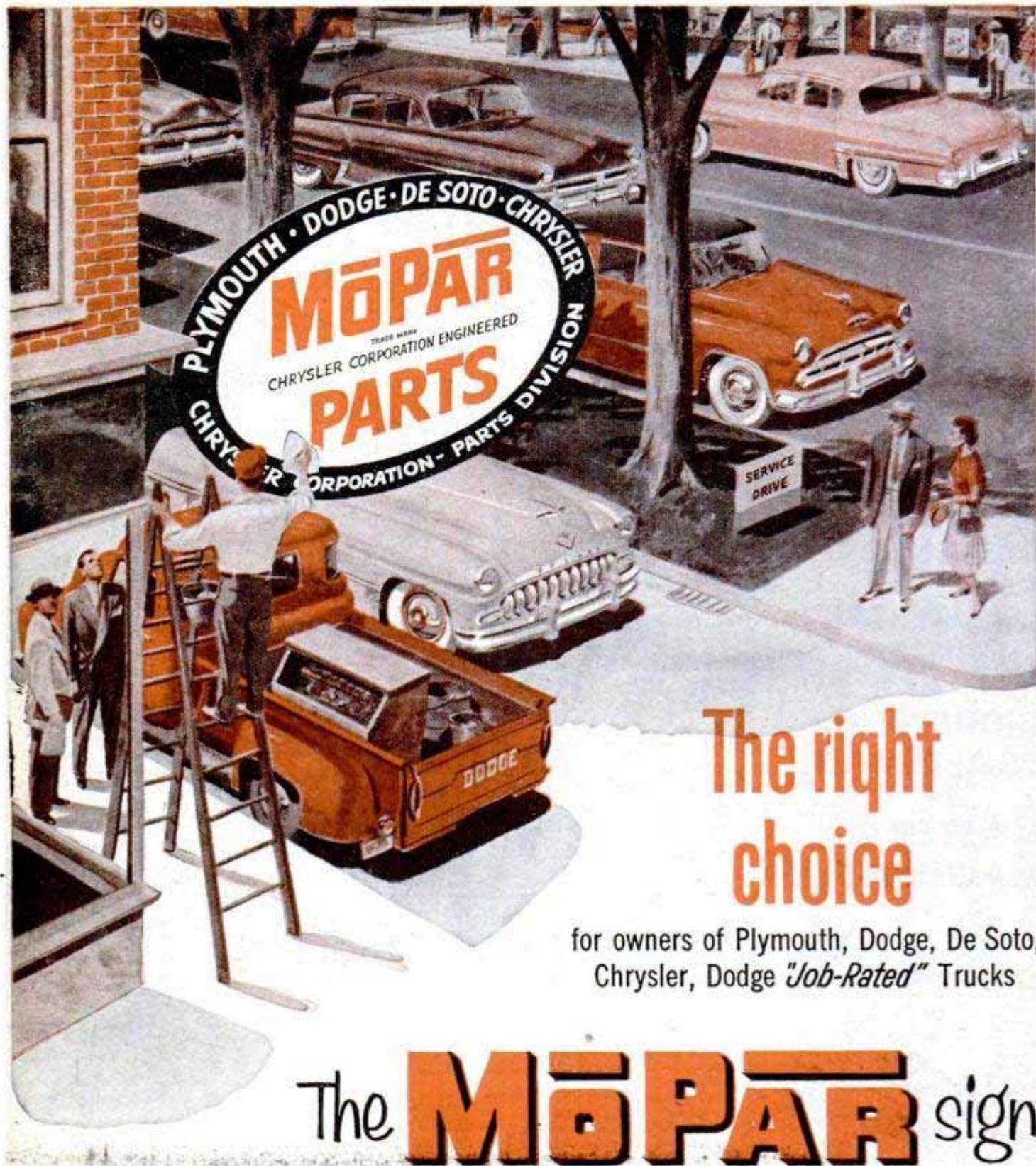
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Port-patrol officer makes a midnight search of a crew member who has slipped down the gangway of his ship

Don't Try to Beat the Customs!

By Clifford B. Hicks

YOU'D NEVER SUSPECT that the tall young man heading toward the trans-Atlantic plane had anything to hide. He moved across the loading apron at LaGuardia Field with the air of a successful businessman. He was wearing an expensive hat, a neat suit—and something else not quite so apparent.

There was only a hint of something odd about the man—the slightly peculiar way his feet flopped as he walked. This was

enough for two agents of the United States Bureau of Customs who were watching the passengers file out toward the plane. They tapped him on the shoulder as he started up the ramp, and also took into tow an older man who seemed to be following him.

The agents, with a quiet apology for delaying the two men, started to examine their baggage. To an untrained eye the older man's suitcase was an ordinary bag, but the agents spotted it as a phony as soon



U. S. Bureau of Customs photos

No cranny is overlooked by the port patrol. These officers found a big opium shipment hidden under a winch

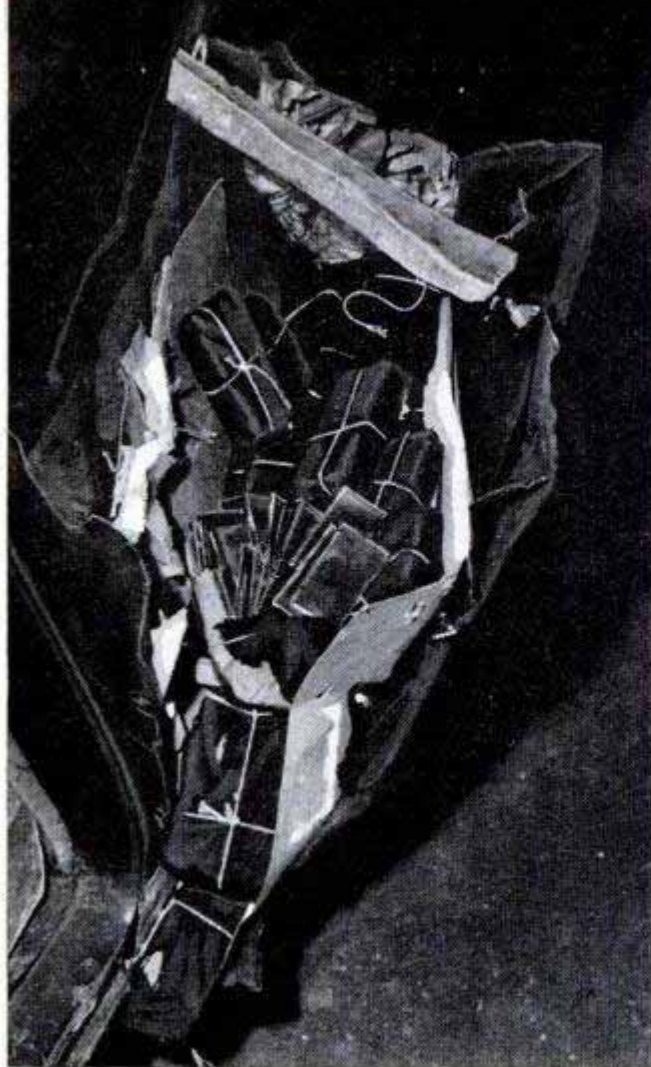
Soybean sauce—100 tubs of it—was shipped from the Orient. When agents poured out the liquid, they found morphine beneath false bottoms in five of the tubs

as they opened it. In the bottom they found a false compartment, and inside the compartment they found the treasure—row after row of glittering gold strips and bars—over \$35,000 worth of gold bidding goodbye to this country.

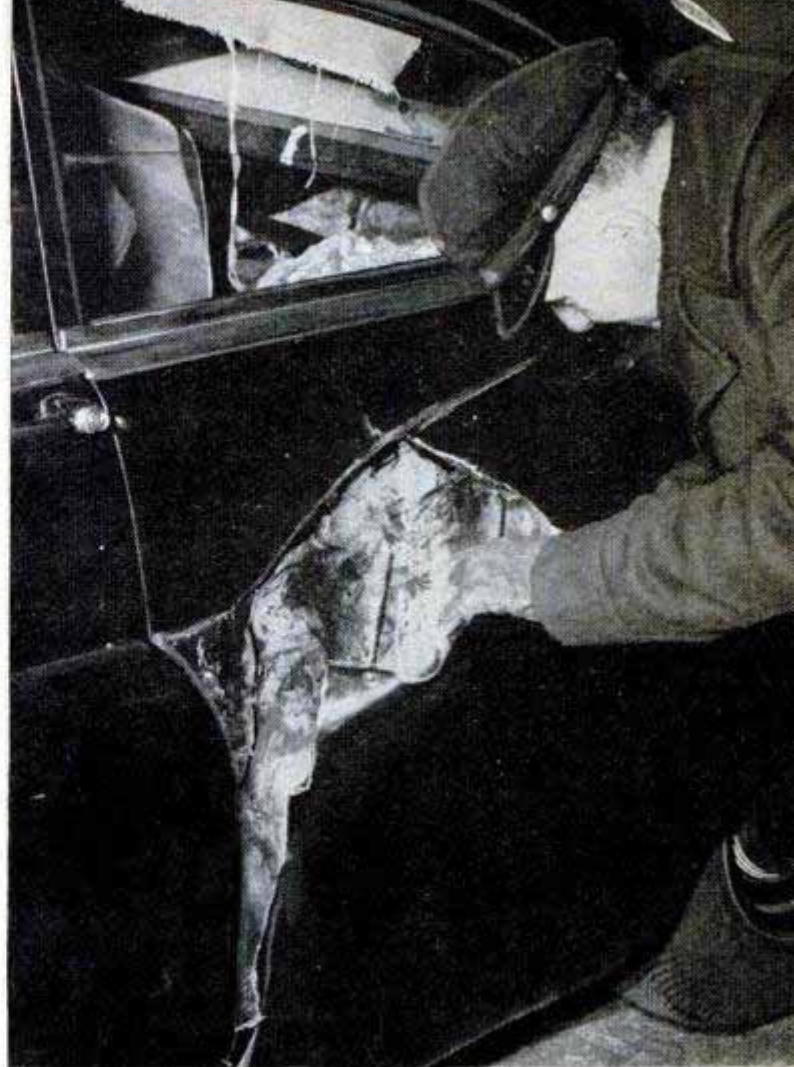
Treasure? Yes, but they really hit the jackpot when they started working over the tall young man. Inside a similar panel in his suitcase they found an even larger cache of gold. But apparently he was an especially greedy smuggler; when he was ordered to strip off his clothes he uncovered a carrying vest loaded with the gleaming stuff. And on his feet—those peculiar flopping feet—were hollowed-out shoes literally jammed with gold. He was a walking mint. The pair of gold-packed shoes alone weighed 11 pounds!

Men of the customs service still laugh at the armor-clad gold-slippered smuggler, so over-





Hidden in a car supposedly taken abroad for tourist use was 340 pounds of gold bullion, worth \$125,000



Gold shown in photo at left was hidden in this fender. Uneven weight on rear springs tipped off the agents

laden with loot he literally couldn't hold up his feet.

To men of the customs, though, there's seldom anything very humorous about smuggling. Their code is rigid; they see very little difference between the racketeer who smuggles a fortune in contraband, and Aunt Mathilda who tries to sneak a new diamond hatpin past the baggage inspector. Both the racketeer and Aunt Mathilda are criminals, guilty of exactly the same crime. So the customs men work methodically toward the unattainable goal of nabbing every smuggler that steps ashore from overseas or attempts to dodge across the borders from Mexico or Canada.

The job is like turning a man loose to hunt a needle in a thousand haystacks. There are only 3300 customs inspectors, agents and port-patrol officers to do the work. During 1952 they made 13,075 seizures of contraband.

To find these scattered "needles," reports David B. Strubinger, Acting Commissioner of Customs, they checked more than 100,000,000 persons who came into the country; they examined a whopping 23,847,939 pieces of baggage; and they processed 4,500,000 entries of merchandise and 6,000,000 export declarations.

The number of seizures is of very little

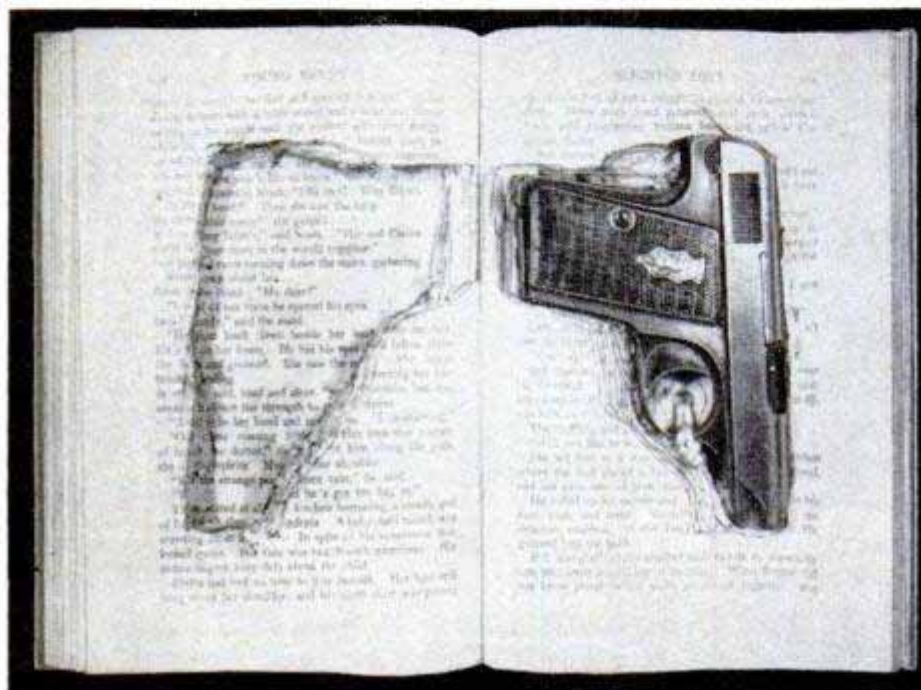
Out tumbles another big shipment of narcotics. Officers found it carefully buried in ship's refuse cans

U. S. Bureau of Customs photos





Diamonds worth \$200,000 were found in "wedgie" shoes of plane passenger



Seaman had a "foolproof" plan of concealing pistol in a cut-out book. Agents found pistol during a search of his bunk after ship docked. Below, big narcotics shipment was located inside spare tire of car at Mexican border



significance in determining the value of the customs. Customs undoubtedly is one of the country's biggest bargains. In 1952, for example, it cost us only \$6 to collect every \$100 in revenue through customs—a neat \$94 profit.

It's impossible to calculate the one really significant figure that would show the value of the service: the amount of contraband that would be brought into this country if there weren't an alert customs inspector awaiting every person at every entry point. Both the racketeer and Aunt Matilda know they'll have a trunkful of trouble in squirming past the inspector's eyes. Only a long-shot gambler would try.

To snare those who are determined to take the gamble, the customs service maintains baggage inspectors at all points of entry. The baggage inspector's usual catch is the personal smuggler who tries to sneak in one or two expensive items without paying the duty, though an inspector occasionally nabs a commercial narcotics or gem smuggler.

Virtually every seizure by a baggage inspector is a tribute to his rather astonishing "sixth sense." The determined smuggler has an obvious advantage in this game of hide-and-seek. He knows that the inspector can't possibly probe the shoes of every passenger, or compare the inside and outside dimensions of every piece of baggage. The smuggler has only two problems: the minor one of concealing the contraband, whether it's one Swiss watch or a hundred thousand shots of heroin destined for our teen-agers (actually, there are only a few places on the person or in the baggage

where contraband can be hidden); and the major problem of acting perfectly natural so the inspector won't start probing for that hiding place. The smuggler knows he's caught as soon as he's suspected.

The inspector, on the other hand, has no weapons but his eyes, his training and his experience in down-to-earth psychology.

The amateur smuggler usually pops up with an old trick under the mistaken idea that he's hit upon a brand new and flawless way to outsmart customs. One old favorite is the oversewn label. The unscrupulous tourist, usually a style-conscious woman, takes along an American clothing label when she sails for Europe. After buying an expensive fur coat in Paris, she sews the American label over the Parisian one. (Customs inspectors say such women seldom remove the European label—when they are safely home they want to show it off to friends.) The inspector is a man of diverse knowledge. He's aware of all sorts of odd facts, from the kind of leather used on the band of a particular Swiss watch, to the type of stitches used in a certain Parisian fur salon. It's easy for him to spot an oversewn label.

Sometimes a woman, while touring Europe, will have a big new diamond mounted in a scratched old ring. This, too, is easy to spot—the inspector merely looks on the bottom of the stone for the grease that accumulates from the skin over a period of time.

Unscrupulous tourists can come up with a good many sly tricks, though. They hide gems in toothpaste tubes, aspirin bottles and shaving cream. One man may wear half a dozen watches on the upper part of his arm beneath a coat sleeve. Another may cut a gem pocket through half the pages of a book and carry the volume ashore. A third may carve out the back of a hairbrush, or drop a brooch into a half-empty package of cigarettes.

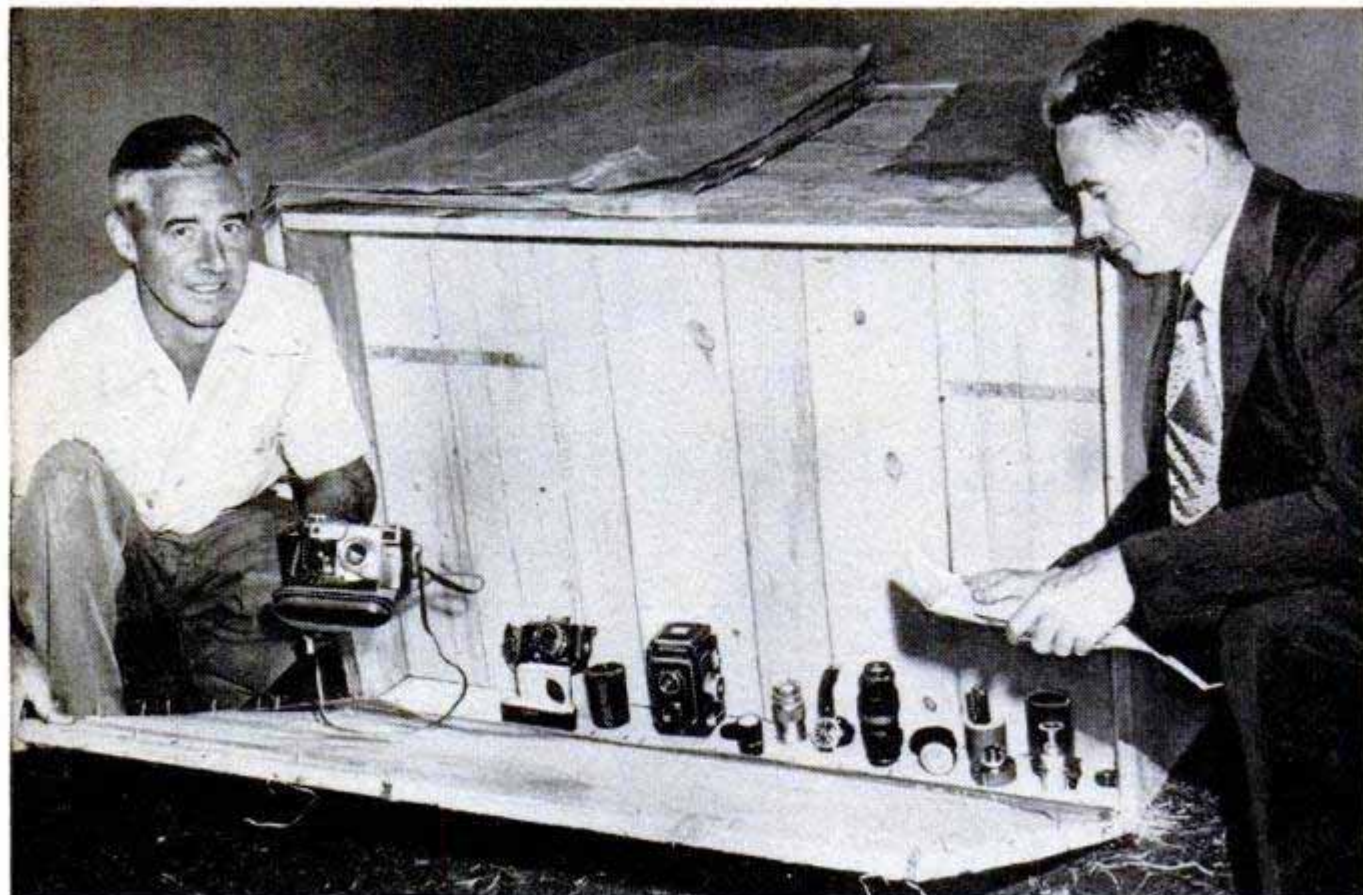
Despite all their ingenuity, there's one thing most of them can't do—they can't act completely natural in passing through customs. The inspector probably is the world's best drama critic; he can detect one fleeting but false move.

As the honest tourist passes



Customs also watches flow of export goods. This shipment, labeled "rags" for export, actually was military clothing. Below, suspicious officers use electric drill to probe bales of wool





Typical false bottom was built into this packing case for the smuggling of cameras, spare parts and watches

through customs, he may feel that the inspector is not doing a thorough job. If the tourist has a trunk, the inspector will pull out one of the drawers and place it casually on top of the box while he makes a pass at the clothing inside. Actually, those casual fingers are very carefully comparing the depth of the drawer to the depth of the trunk in order to detect a false bottom.

Baggage inspectors aren't the only treasure hunters in the customs service. Port-patrol officers, for example, have seized enough narcotics to produce millions of "hop dreams" and a jump in the crime rate.

Whenever an ocean-going freighter ties up at a pier, the port-patrol officers swarm aboard and start combing the ship thoroughly, seeking narcotics and other contraband that may be slipped ashore some dark night by a crew member. No spot is too dirty, dark or small for the port-patrol officers to search with probes and crowbars. They find narcotics in secret panels behind crew lockers, buried in buckets of sand, packed in flashlights, behind dresser drawers and at the bottom of fuel tanks.

Furthermore, port-patrol officers patrol the dock areas to prevent theft and the illegal entry of persons or goods. It's dirty, dangerous work. In the New York area, a port-patrol officer was killed by gunfire while preventing a theft and another was stabbed by a narcotic-laden seaman.

Customs officers on the West Coast not long ago were tipped off that a packet of

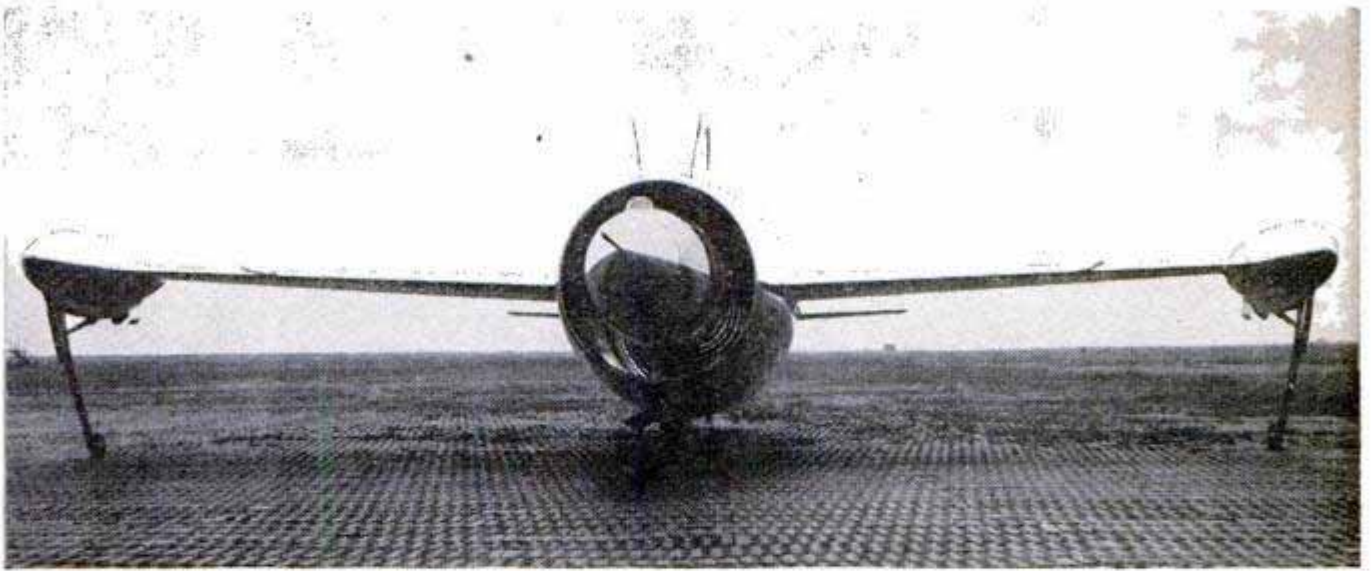
narcotics was hidden aboard an incoming freighter. The officers boarded the ship and within two hours had spotted the bundles, stuffed into a pocket carved in the wooden fender of the vessel's forepeak. Though they found the cache, they hadn't nabbed the offender so they continued the search without a sign they'd spotted anything wrong. Eventually the search squad departed, and electricians, longshoremen, union delegates and health inspectors poured aboard for routine work. Actually these men were other customs officers in disguise.

For three days the secret compartment was under constant scrutiny, but no crew member made a move toward it. Finally on the fourth day a seaman appeared to be "casing" the area. Later he reappeared, went straight to the cache and began stuffing his pockets. He was nailed immediately. The packages contained 100 ounces of heroin valued at a million dollars.

A good many exciting tales have come out of the customs service, but the most fascinating of all are those told by the agents assigned to special racket squads. Their job is to pin down commercial smugglers—racketeers who make a big business of evading customs.

Sometimes only the small-fry "carrier" of contraband can be arrested and convicted, while the "principals"—the men behind the racket—can't be touched. The principals band together to form a business—

(Continued to page 246)



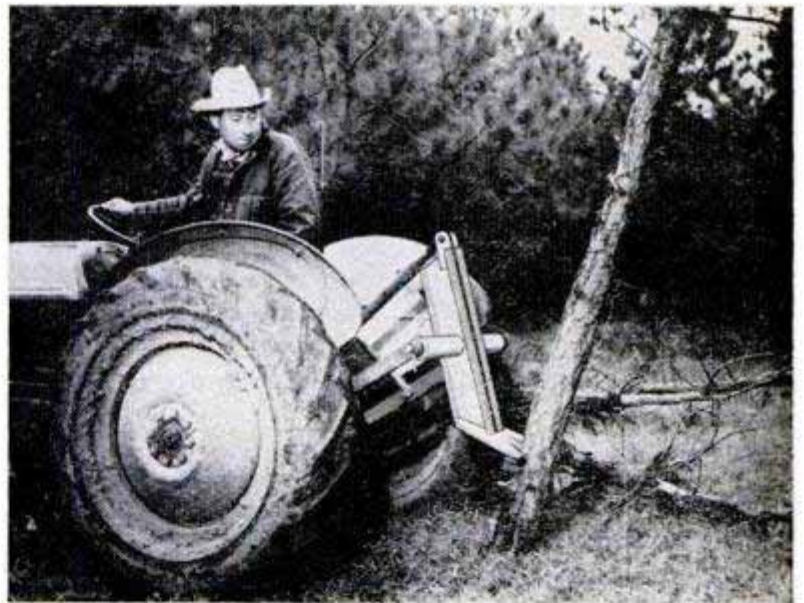
French Barrel Jet Has Transparent Nose

Designed for supersonic flight, the newest jet built by France's Rene Leduc has a transparent nose and a barrel-like shape. The craft has a central-type landing gear

and stubby wings. It is also capable of being flown after release at high altitude from "mother" planes. Leduc's first models were flown as gliders.

Forked Tree Grubber Fits Hydraulic Lift

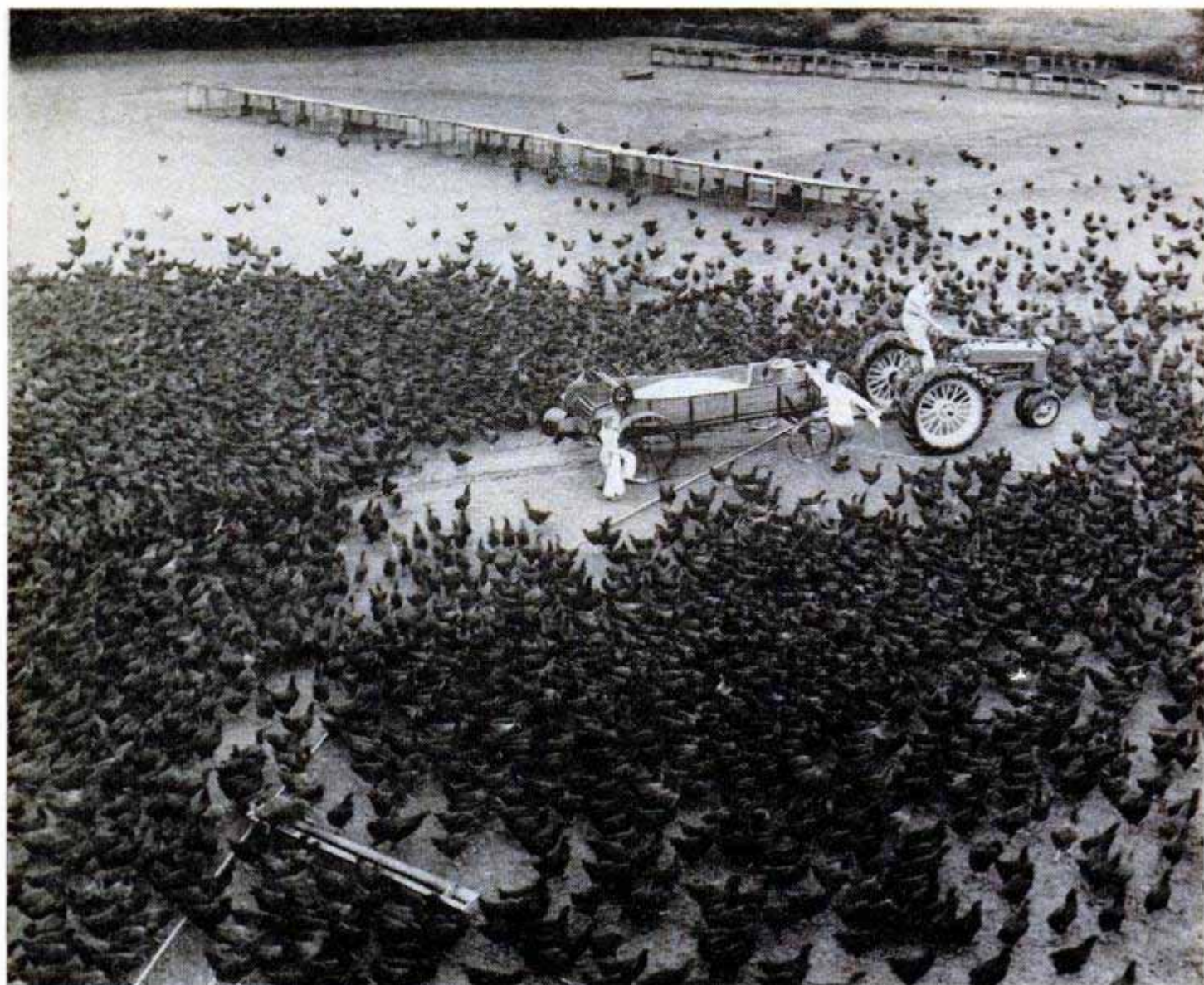
Trees up to six inches in diameter are quickly yanked out of the ground by a forked implement which fits any three-point hydraulic tractor lift. The tractor with device attached backs into a tree and pushes it horizontally. At the same time, the hydraulic lift raises the tree vertically. The tree, roots and all, is pushed out of the ground at a 45-degree angle away from the tractor driver. Weighing only 80 pounds, the implement is easily attached or removed from the tractor.



Slotted Helmet Stays on During Supersonic Bailouts



Slots cut into the front of a new type pilots' helmet are expected to keep it from blowing off during bailouts at supersonic speeds. Tests indicated standard helmets tend to be blown off at extreme speeds, leaving the escaping pilot without protection from wind blasts and without oxygen, since the oxygen supply is attached to the helmet. The vents allow air pressures to escape as well as creating a partial vacuum which helps hold the helmet firmly in place. The openings were cut into the helmet in the areas which showed up as negative pressure areas. Designed by Douglas Aircraft for the Air Research and Development Command, the new helmet has been successfully tested in a wind tunnel, subjected to air blasts from all directions.



Schultz, who raises the pullets, starts off with a load of feed while his children shoo away the huge flock

HENS NEVER HAD IT SO GOOD . . .

as they do at "Chick" Raskin's egg factory. Strange machines feed, water and just plain pamper the feathered workers. Lazy hens don't even have to bend over to eat. The result? Eggs by the acre

By **RICHARD F. DEMPEWOLFF**

HUNDREDS of factory buildings sprawl across the hills around Waterbury, Conn., but for sheer production efficiency not one of them can beat a new neighbor. Inside this new factory there are 60,016 workers. Of this number, only 16 are people. The rest are hens—40,000 layers and 20,000 growing pullets.

Man and bird, these workers mass-produce, clean, sort, package and market up to 15,000 dozen eggs a week. And it's all done to the hum of motors, the whir of endless belts, the clatter of machinery and the click of electronic controls in slick

modern buildings where every square inch serves a purpose.

The unique egg factory, which caters to every whim of its feathered workers, commands a whole hillside in Marion, near Waterbury. Designed, owned and operated by 34-year-old A. J. Raskin (appropriately dubbed "Chick" by his friends), the egg empire has 10 big mechanized chicken coops which are dominated, in turn, by two huge new buildings that bear absolutely no resemblance to the traditional hen house. Each measures 420 feet long and 50 feet wide. In their eight separate pens, 50

by 200 feet, the thousands of hens cluck contentedly as they lay millions of eggs in year-round solid comfort.

Painted on the farm's big refrigerated truck is the slogan "Eggs From Happy Hens" and any self-respecting hen that's seen the set-up would scarcely quibble. Through the open sides of the big pens, the feathered workers get a million-dollar view of the hills of Connecticut. Twenty 16-inch fans blow a cooling breeze through each of the buildings. In winter, plastic glazing snugly seals the open ends and sides, and fans operated by thermostat waft warm air through the buildings to keep the litter (regularly dusted with DDT) soft and dry.

There's no scrambling for dinner in these de luxe quarters. The pampered hens don't even have to bend over. Feed circulates at beak height on endless-chain conveyors that are triggered by electric time clocks. Clean, fresh water flows continuously along troughs in each pen. For hens that are too lazy to hop up to the trough, pans of water fed by valve taps are provided. Metal floats open the valves when the water level gets low, and close them when the pans have been refilled.

Chick Raskin's egg factory proves that an enterprising farmer can build a big business on very little money. Chick began farming with \$80 borrowed from his uncle back in 1936, plowed back his profits, and snowballed a backyard operation into what is one of the biggest egg businesses in New England.

"Mechanization and volume production are the only secrets," he says. "They work for industry and there's no reason why they shouldn't work for the farmer. The advantages far outweigh the costs. Take a hen house on the average egg farm. It must enclose about three or four cubic feet per bird for good conditions. With our temperature control, air control and automatic feeders we need only 2½ cubic feet per bird—so we get more birds in the same building space. On the standard farm, one handler can manage about 2000 to 3000 birds. Here, one man without help takes care of some 9000 hens during a nine-hour day."



Bob Place photo

Only unmechanized job in the "factory" is gathering of the eggs



Dozens of dozens of eggs are wheeled into cooling room. Below, eggs on endless belt are washed and graded by machine



You see how one man can do that much work when Raskin leads you to the area in the center of the building, between the two upstairs pens. The walls are stacked with feed bags.

"We buy feed by the freight car" he points out. "A truck ramp leading to the second deck makes delivery simple. Feed for downstairs is poured down chutes."

Once a day feed is simply dumped into huge metal drums—one for each pen—and 40,000 hens are fed for the day. Paddles on the drum bottoms rotate to stir the grain. Endless chains vanish empty into the bottom of the drums and emerge pulling a cargo of feed around the two 400-foot tracks that circle each pen. Electric timers start and stop the 31 belts around the farm on proper feeding schedules.

Collecting some 25,000 eggs a day is a different problem. Raskin confesses he laid an egg himself in trying to solve it. "I had a man build me an automatic egg collector. Basically it was a belt under a battery of nests. The hens, according to calculations, would lay their eggs on the belt. Then at the flick of a switch the belt would move the eggs to the collecting area between the pens. It was a good idea, too. Only trouble was, the hens didn't like nests over a belt so they laid eggs on the floor.

Today the production-line collector lies abandoned in an empty field. The eggs are scooped out from under their original owners by hand, collected in rubber-coated wire baskets and moved on dollies to the



Bob Place photo

Once a day enough feed for 20,000 chickens is dumped into the big hoppers, where it is mixed automatically

big cooling room in another building, where 1200 cases can be kept at a constant 55-degree temperature until another batch of machinery is ready to accept them. This is virtually the only hand operation in the entire assembly line at Raskin Farms.

Once cooled, the eggs are trundled out on dollies. Two girls hover over a moving track that continuously circles a stainless-

Chick raiser loads feed into manure spreader and rolls across the range, unfurling long ribbons of pullets





Bob Place photo

Chain conveyors—31 of them—distribute feed around the unique hen houses. Conveyor disappears into hopper at left, comes out loaded at right. Clocks operate electronic switches to feed system at scheduled intervals

steel table. They load soiled eggs into little sections of the track. Water jets spray the bobbling eggs, which roll and rub over brushes as they move. At the other end they come out spic and span, washed and dried. Then all the eggs move off to an automatic grader—a traveling belt that spreads them apart, carries them along in wavelike motions and sets them down on a series of counterbalances. Big, heavy eggs tip the first balances and roll into “big egg” bins. Lighter and smaller eggs move farther along, tip lighter balances and roll into their bins. Girls standing behind the bins pop the eggs into colored boxes that come slithering along from a box-making machine which assembles and pushes them out to be filled.

“There’s a new piece of machinery being developed right now,” says Raskin, “that candles eggs automatically by radar. We’ll have that as soon as it is perfected.”

The egg cycle isn’t complete until Chick’s truck backs into the dock to take on its daily load. Though the truck isn’t refrigerated en route, its heavily insulated walls are lined with cooling plates in which a freeze solution can be circulated. During the night the truck is plugged into the refrigerating system which cools Raskin’s egg storeroom. By morning the truck’s interior has a chill which it will retain for 10 hours.

It takes plenty of juice to run this mechanized farm. Poles dot the premises. “We bring in 40 KVA,” says Chick, “to run more than 130 motors that spin our 80 fans, move chains and belts and keep our machinery turning.” To backstop himself in case of

power failure, Raskin bought a war-surplus generator that turns up enough juice to run the basic machinery for the birds.

Raskin buys his chicks from breeders in batches of about 15,000, spaced around the year. That way, when one batch of layers begins a production decline the hens are all moved out at once and a new batch of pullets, ready to start laying, is moved in.

“Meat is a by-product for me, so price is less important than making room for good layers,” says Raskin.

Contract farmers raise the chicks, since Raskin doesn’t want the chore of anything but egg production. But he keeps a sharp eye on the growing pullets. Out on the biggest farm, that of Wilfred Schultz, the baby chicks are started in buildings—one

(Continued to page 222)

Float in watering pan drops as level of water goes down, opens a valve to admit fresh water into pan



Tractor-Mounted Machine Transplants 85,000 Trees a Day



Capable of planting up to 85,000 young trees a day, a transplanting machine makes 5 rows, 11 inches apart, at a time. Built as an integrated unit on an Allis-Chalmers tractor, the machine requires a six-man crew. Five of the men are planters and the sixth man is a machine operator who keeps the men supplied with stock for transplanting. Two men ride on the front end, three on the back end of the machine.

"Talking Typewriter" Records Messages on Magnetized Paper

Magnetized paper takes the place of a recording cylinder in a new dictating machine. As a result, the transcribed message can be folded and mailed like an ordinary letter. In case of error, the operator can backspace the recorder and dictate over the mistake. The dictating machine can be used for immediate play back or for transcribing, and the magnetized paper itself can be reused as many as 2000 times. The uncoated side of the paper allows plenty of room for notes, signing, or even notarizing, permitting use of the recording as a legal document. Attachments for the machine include switches operated by foot and knee pressure.



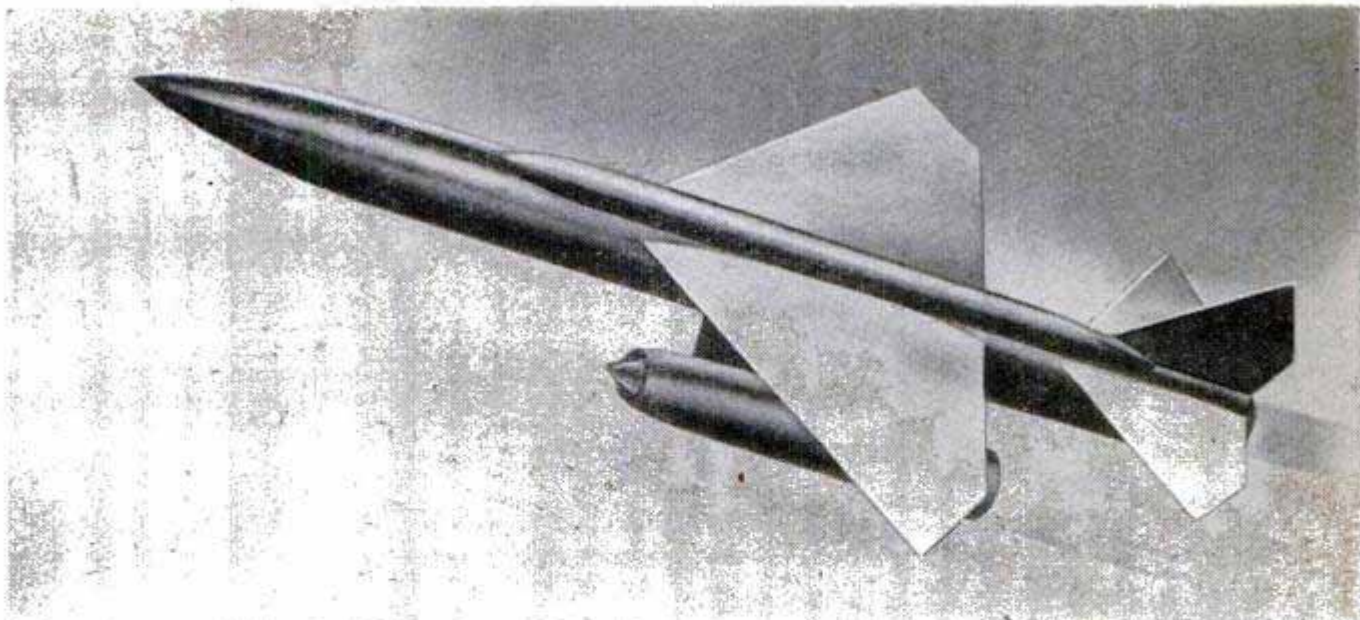
Body Harness Checks Golfer Making Faulty Swing



Held in place by a belt and a strap, a new harness device automatically guides the golfer's swing during practice sessions. It consists of a guide track held in position by a belt strapped around the waist and an armlet strap connected to the track by a length of chain. It stops or limits the swing of a golfer making any of the common errors but doesn't interfere with properly made swings.

Next Month

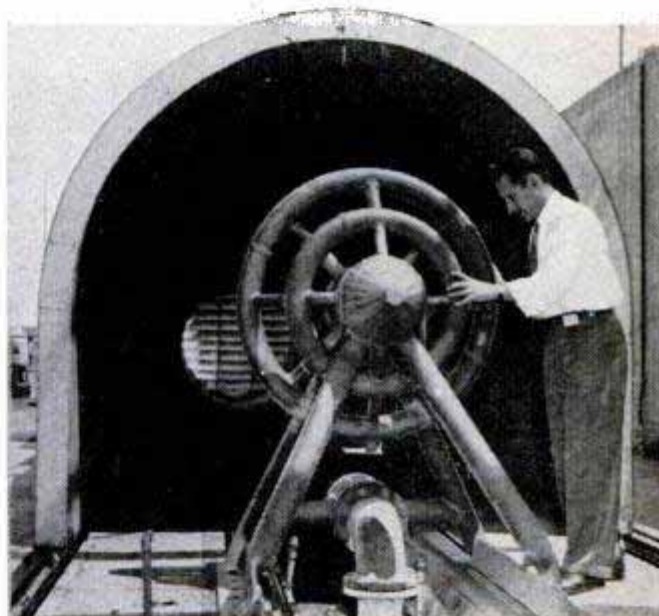
Thomas E. Stimson, Jr., our Western Editor, was not too happy when we sent him up in a night fighter plane on radar patrol. He is not sure airplanes are here to stay. But he loved it when he was assigned to ride a U.S. Navy submarine across the Pacific. He tells his story in the October issue—the first-hand report of a cruise aboard a modern "killer" sub



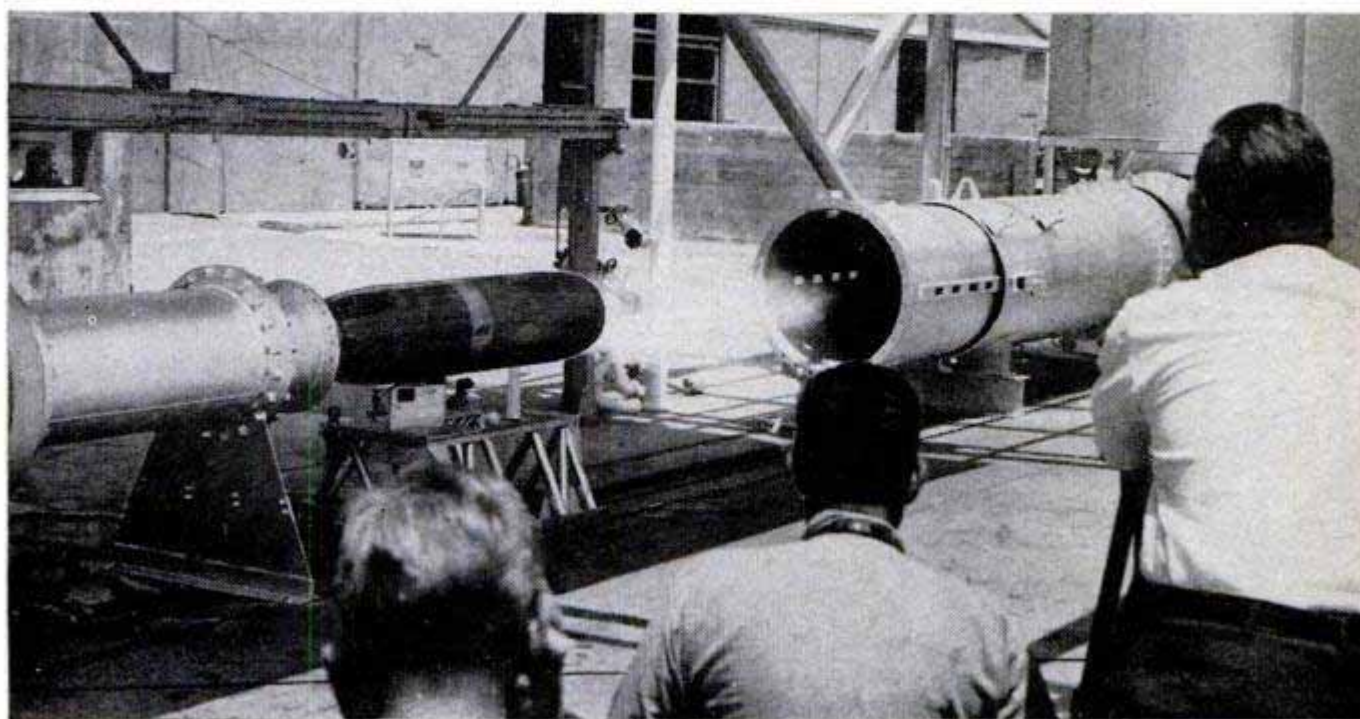
Drawing of the F-99 BOMARC, a guided missile of the pilotless-interceptor type, powered with twin ramjets

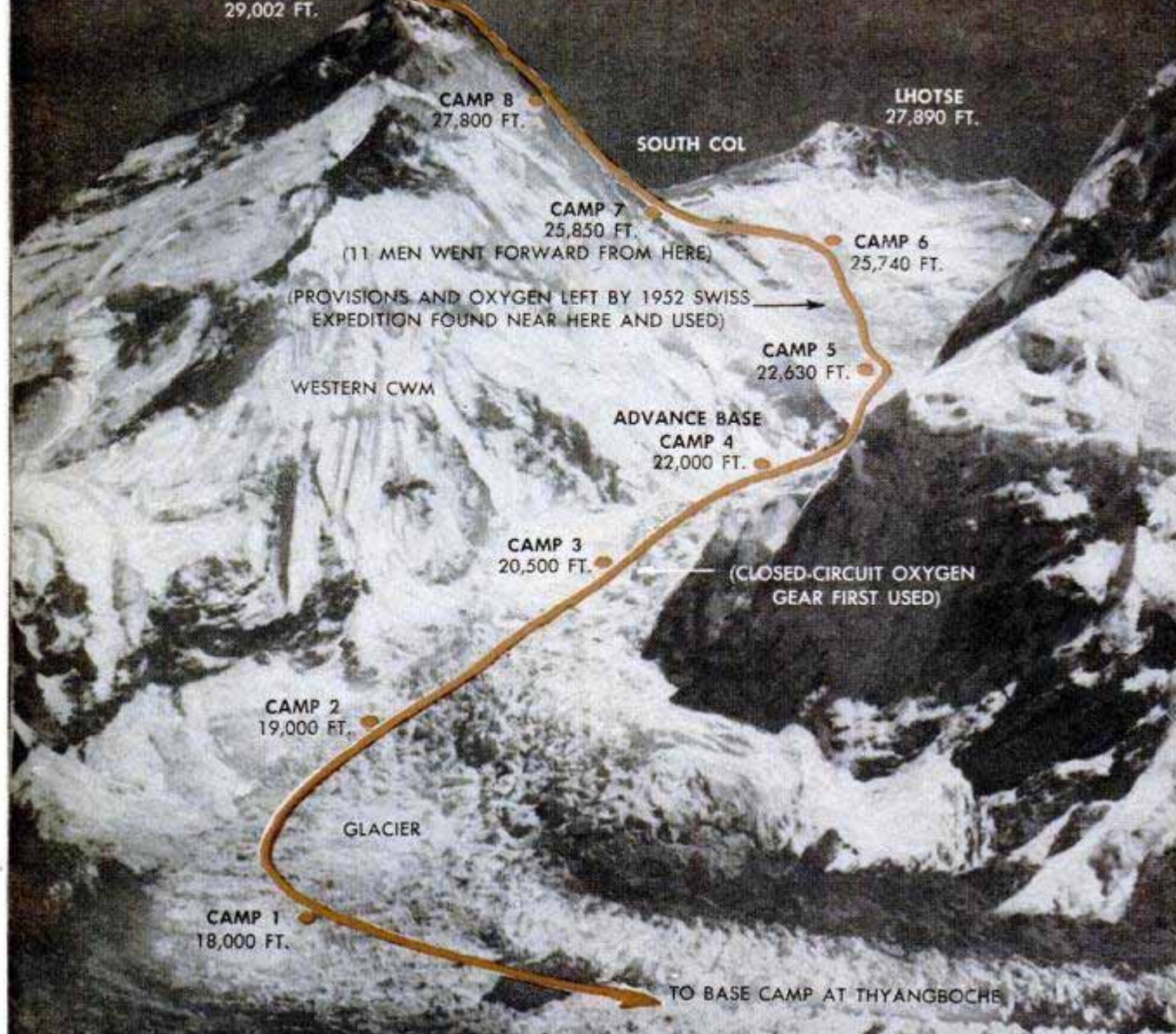
Robot Atom Bombers May Use Ramjets

RAMJET ENGINES now being developed probably will power the intercontinental atomic bombers on which the United States is working. These long-range guided missiles, with robots on board instead of human crews, will navigate to their targets by making automatic celestial observations or by measuring the earth's magnetic forces. They will be difficult to intercept or shoot down because their speed will approach 2000 miles per hour. Speeds like that are anticipated by the Marquardt Aircraft Company of Van Nuys, Calif., which since 1944 has specialized in research and development of ramjet "flying stovepipe" engines. Roy E. Marquardt, president of the company, says that the ramjet is now being considered for airliners of the future.



During tests, water sprayed into exhaust stream, above, reduces noise. Men, below, must wear ear plugs



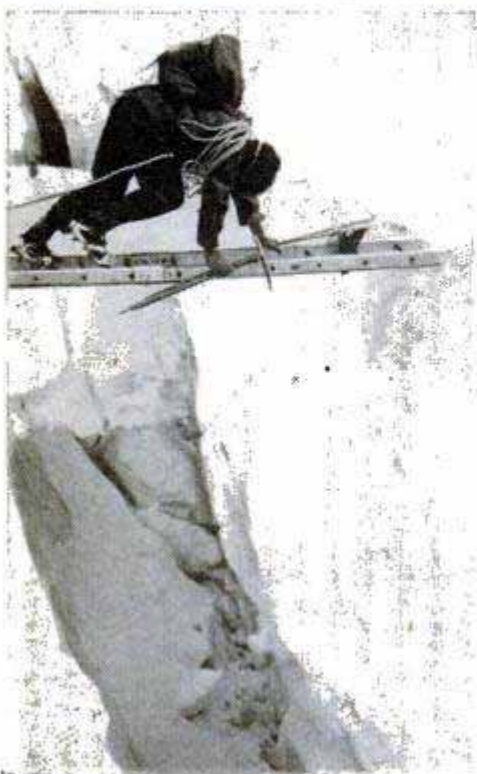


The Times—World Copyright Reserved by Himalayan Committee

Route of the 1953 British Everest Expedition, first to reach the summit of the world's highest mountain

MAN AND SCIENCE CONQUER MOUNT EVEREST

Crossing a crevasse on light ladder

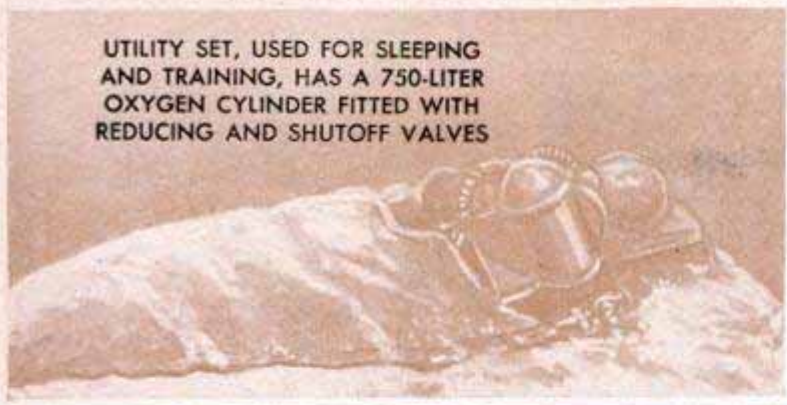


LIGHTER, MORE EFFICIENT equipment played a decisive role in the British expedition's conquest of 29,002-foot Mount Everest, the world's highest peak. The ascent to the top by Sir Edmund Hillary and Sherpa Tensing culminated the eighth major attempt to scale the mountain since its discovery in 1852.

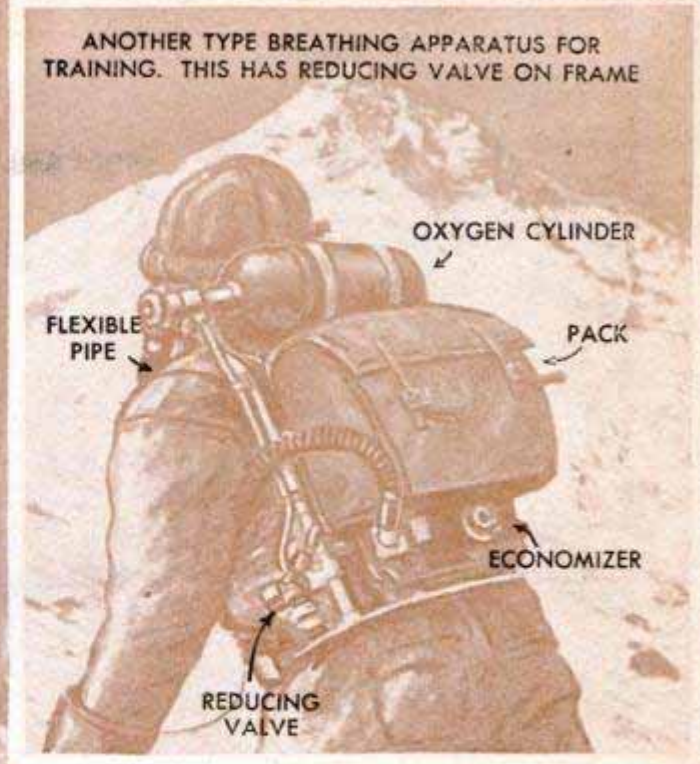
The successful final assault was accomplished with the lightest and most efficient oxygen-breathing apparatus ever used by high-altitude climbers. As each of its three oxygen cylinders was used up, it was discarded, reducing the total 38-pound weight of the equipment by 11 pounds. Two other members of the expedition, using closed-circuit breathing masks, were turned back earlier by oxygen shortage and bad weather after reaching the south peak. With the closed system, a portion of the oxygen breathed from the shortage bottle is conserved and rebreathed to extend its "life."

Above 23,000 feet the climbers wore a newly designed, extremely lightweight boot. It has a thin outer layer of glaze leather and an inner layer of impermeable cloth, with insulating material between them. Instead of the heavy-treaded rubber soles of Alpine boots, they have soles of micro-cellular rubber, which is lighter and provides better insulation. Despite their bulk, an average pair weighs only about four pounds 10 ounces.

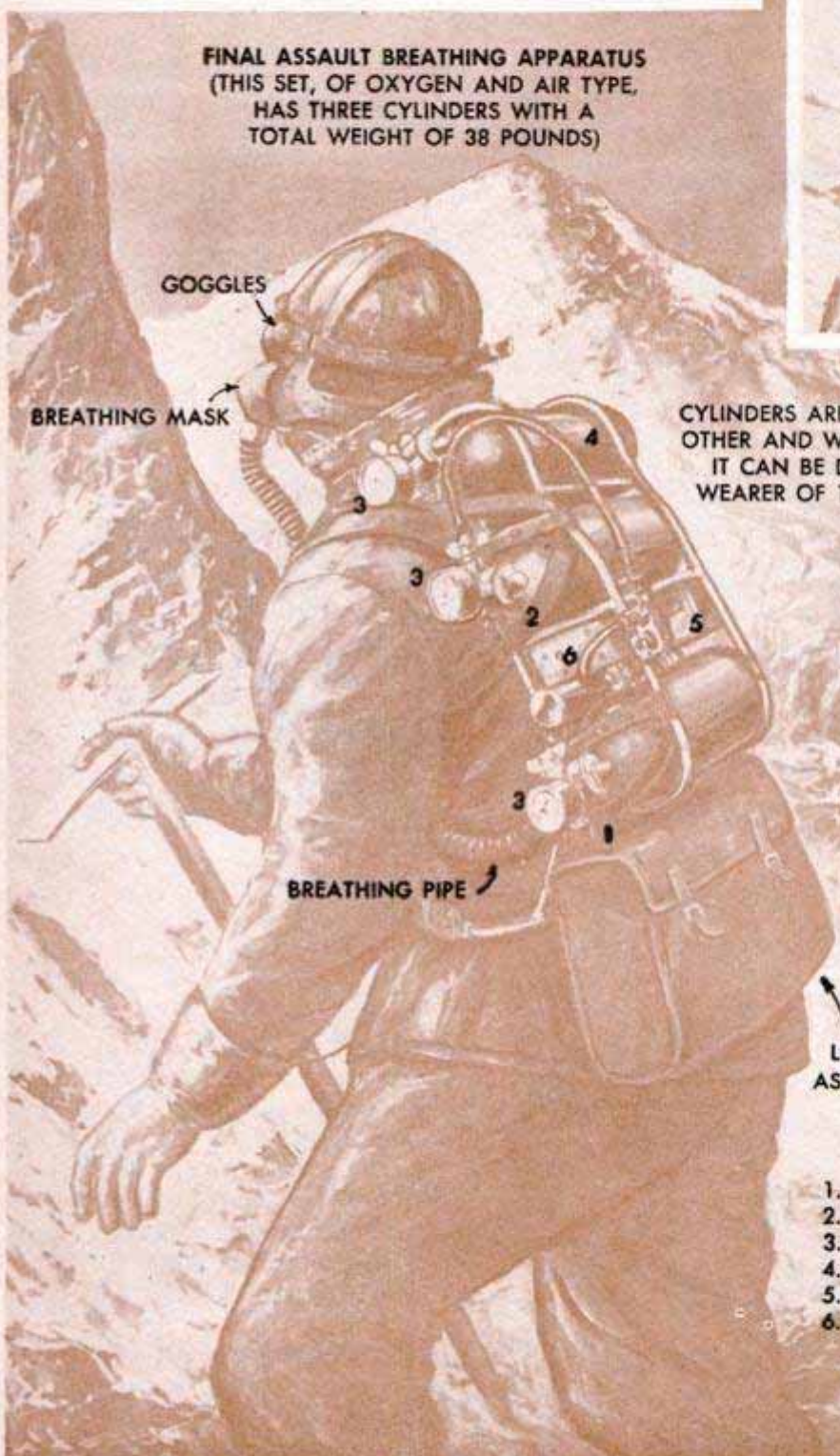
UTILITY SET, USED FOR SLEEPING AND TRAINING, HAS A 750-LITER OXYGEN CYLINDER FITTED WITH REDUCING AND SHUTOFF VALVES



ANOTHER TYPE BREATHING APPARATUS FOR TRAINING. THIS HAS REDUCING VALVE ON FRAME

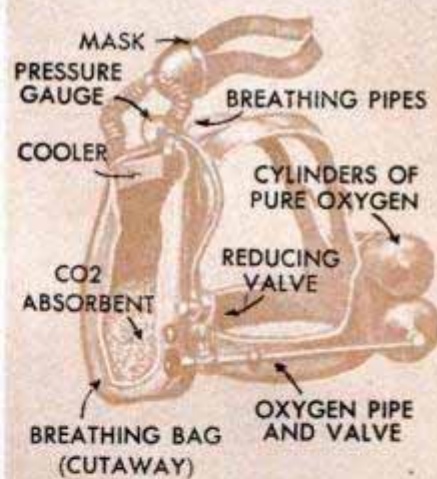


FINAL ASSAULT BREATHING APPARATUS (THIS SET, OF OXYGEN AND AIR TYPE, HAS THREE CYLINDERS WITH A TOTAL WEIGHT OF 38 POUNDS)



CYLINDERS ARE INDEPENDENT OF EACH OTHER AND WHEN ONE IS EXHAUSTED IT CAN BE DISCARDED, RELIEVING WEARER OF 11 POUNDS OF WEIGHT

CLOSED-CIRCUIT BREATHING UNIT



1. SHUTOFF VALVE
2. PRESSURE REDUCING VALVES
3. PRESSURE GAUGES
4. FLEXIBLE OXYGEN PIPE
5. MANIFOLD WITH ALTERNATE JETS
6. ECONOMIZER

Four different kinds of breathing apparatus were used during the training and the actual ascent of the peak

The climbers wore insoles with a light-weight rubberized fabric backing and plastic-fiber stockings.

Vacuum packs solved the problem of

providing enough calories for the expedition during the critical final few hundred feet. They had 1200 one-man rations, sufficient to last 24 hours. ★ ★ ★

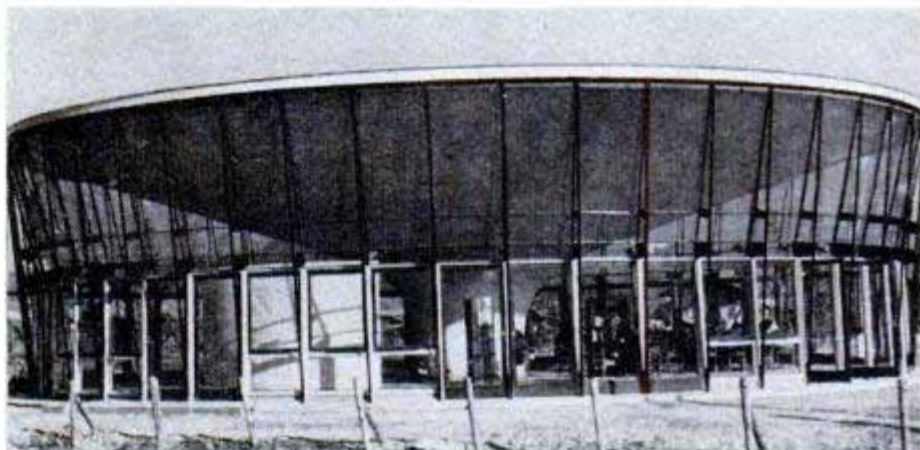
Gasoline Engine Replaces Coolie Power in Pakistan Ricksha



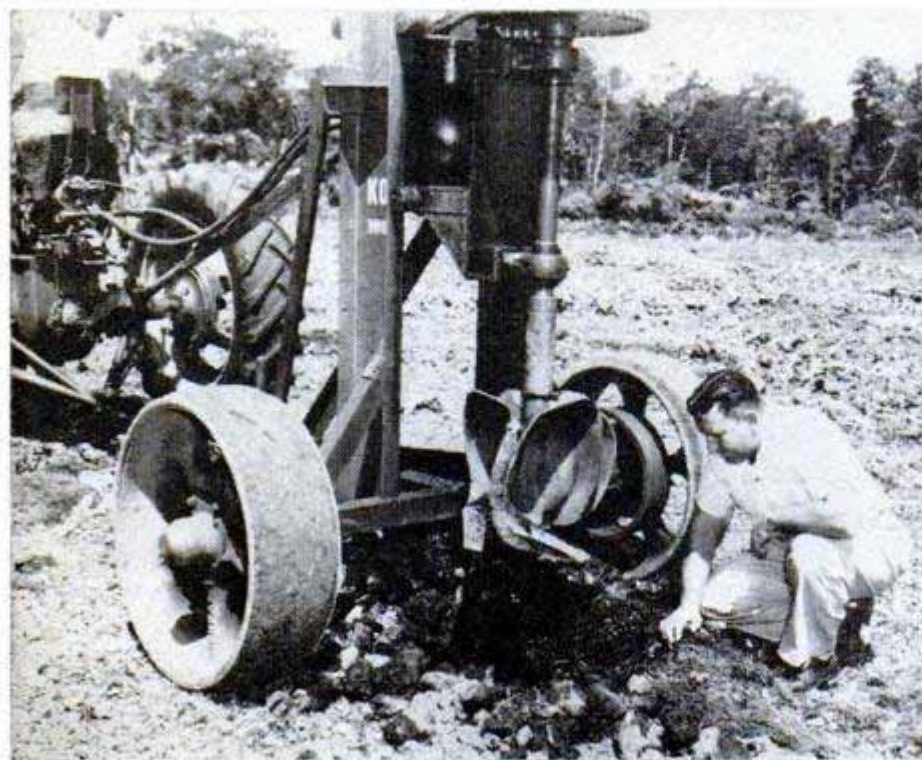
Pakistan's jinrikishas have joined the mechanical revolution—they are being motorized by a two-cycle gasoline engine. Made in Germany, the ricksha is pulled by a front-wheel-drive unit that looks like part of a motor scooter. If desired, the two-seater trailer can be replaced by one designed to haul packages or light freight. Maximum speed of the vehicle is said to be about 40 miles per hour. Twenty of the rickshas have been sent to Pakistan by the German company.

Single Column Supports Roof of Hiroshima Mushroom Library

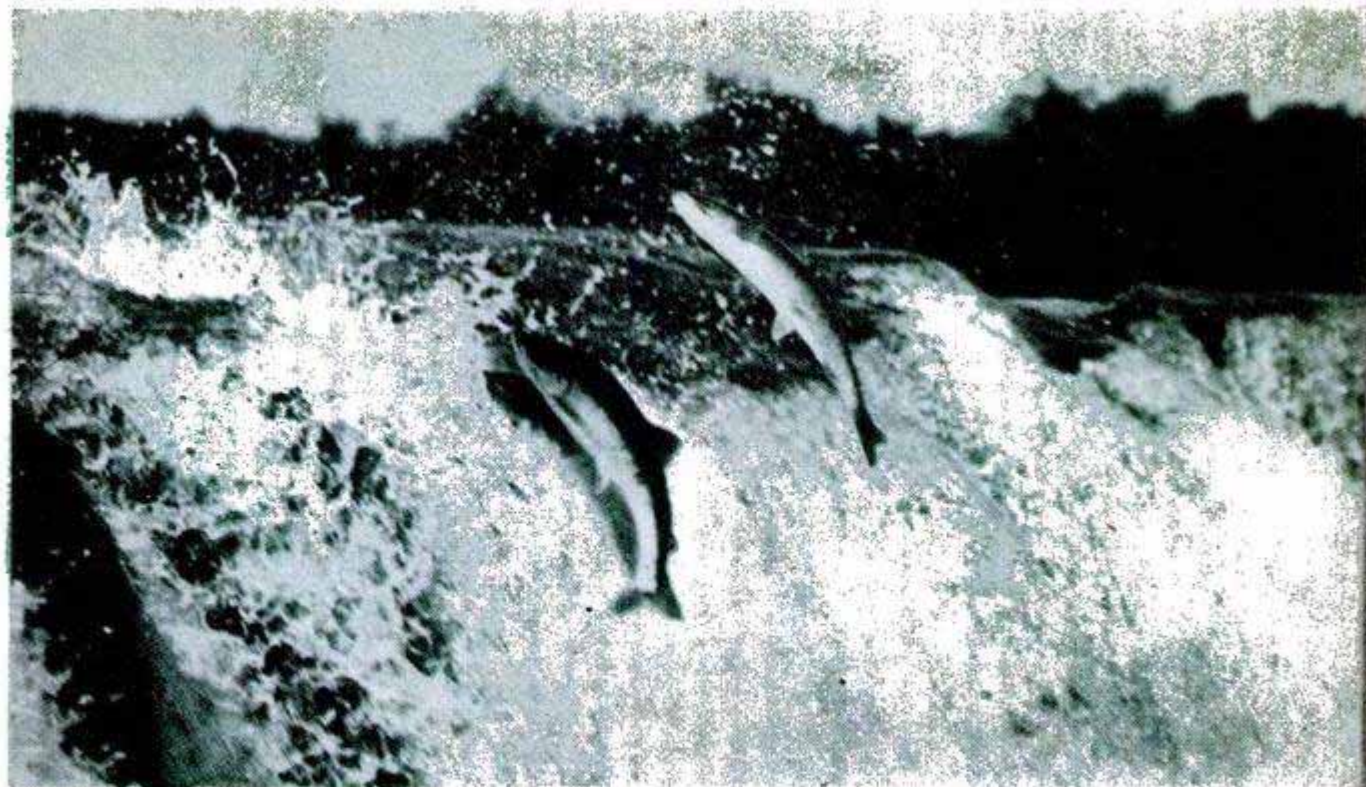
Atom-bombed Hiroshima has a new library of striking design, circular in area, with outer walls entirely of glass and steel. The entire roof support comes from a column in the middle which supports a funnel-shaped ceiling. The building was erected with funds sent by former residents of the city now living in the United States.



Hole Digger Drawn by Tractor Plants Hawaiian Nut Trees



Macadamia nuts, an important new agricultural crop of Hawaii, are harvested from trees that thrive in the soil created by decomposing lava rock. The problem of planting trees in the strange soil has been solved with the aid of a tractor-drawn hole digger. The digger, which operates off the power take-off, has sharp plowlike blades that cut into the earth and deposit it around the hole, where it can be easily backfilled when the young trees are planted. Sugar and pineapple, Hawaii's two important crops, can't be cultivated in the decomposed-lava soil.



More food in their Alaskan birthplace means more famed red salmon. Fertilization experiments begun three years ago by the U.S. Fish and Wildlife Service promise to halt gradual disappearance of the prized fish

Bringing Back the Red Salmon

By Rafe Gibbs

Salmon counting made easy. Here a government biologist checks them off as they swim through a weir and over a white board

IN ALASKA, where men have long gambled for big stakes, scientists are sitting in on a game with millions at stake—millions of famed Karluk red salmon. The game, which involves unique lake-fertilization experiments, is being played on Kodiak Island in one of the world's loneliest spots. To date, the scientists are winning, and thousands of fishermen are "kibitzing" because the final showdown may revolutionize fish conservation plans throughout the world.

On a spring day in 1950, a sea-plane began circling a small lake that looked like nothing more than a foot bath for a Kodiak mountain squatting beside it. Actually, the lake—known as Bare and unknown to most map makers—is only 3000 feet by 1500 feet.

The two passengers, Charles Hunter and Carl Schroeder, young biologists on seasonal duty with the U.S. Fish and Wildlife Service, looked questioningly down at the lake, then at one another. Schroeder turned to the pilot, and yelled:

"Hey! We're not going to land down there?"





Lake-water samples, left, have to be taken at regular intervals to check progress of the fertilization. This is the easiest job on the biologists' work sheet

Pilot Al Kropf grinned. He is well known to men of the Fish and Wildlife Service, whom he frequently drops in odd and treacherous spots, for two things: (1) His always immaculate clothes, and (2) his dexterity in landing a seaplane on lakes where ducks have to be careful.

"We are not only going to land down there," said Kropf, "but you fellows are going to live and experiment there."

A new home of science in the wilderness . . . lakeside bogs to attract white sock flies by day and mosquitoes by night; berry-bush covered hills to attract roving Kodiak bears at any hour; mist and rain by the week to attract no one. The Indians describe such places briefly: "Ugh!"

Kodiak Island, which is Alaska's biggest—100 miles long and 50 wide—was the site of the Russians' first capital in their settlement of Alaska and today some of its valleys, growing unusually luxuriant grass, beckon to dairy farmers. Kodiak Island, however, is not noted so much as a home for man, but as a home for the brown bears which are the world's largest carnivorous animals, and for the red salmon which may not be the biggest fish but are among the tastiest. Much of the island is—well, like the Bare Lake area.

Pilot Kropf landed the seaplane on the lake, churned it to a stop within inches of a bog with extensive miring potentialities, jockeyed it over to a solid-rock outcropping for mooring, then proceeded to take off his pants.

"What gives?" asked Hunter.

"Well, either I get into some old clothes," retorted Kropf, "or you guys unload all the fertilizer we've got aboard this plane by yourselves."

The reason for unloading tons of fertilizer at Bare Lake in 1950 went back a half-century. In 1901, the catch of Karluk red salmon totaled almost 4,000,000. Men in dripping oilskins grunted and groaned to lift the sagging nets. But there were bonuses at season's end and big blowouts in Seattle.

Now the annual catch runs only 400,000. No bonuses, no blowouts.

Sockeye or red salmon has long been prized by both the commercial fisherman and the sportsman—and the housewife who buys it in the can. At your local grocery store you'll find red salmon brings a premium of about 30 cents a can over pink.

Years ago, when the Karluk red salmon catch first began to fail, an enterprising Alaskan canner turned to marketing pink salmon in cans with labels reading that "this salmon is warranted not to turn red in the can." He made a fortune on the alleged "special processing," and today you will still find some of his old customers who think red salmon is nothing less than spoiled salmon.

Law put proper labels on cans, but didn't put more red salmon in them. Scientists began research on the Karluk red-salmon project in 1926, but ways to increase the runs eluded them—year after year. The Karluk reds seemed to be on the path that took the passenger pigeon to extinction.



Groups of up to 16 Kodiak bears, the world's largest carnivorous animals, have been seen around the camp

Now there is hope—much hope—for a big comeback.

The new lake-fertilization project is being carried on by Philip R. Nelson and his right-hand man, Carl A. Abegglen, of the Fish and Wildlife Service. Hired as a consultant is Dr. W. T. Edmundson, professor of limnology (scientific study of fresh waters) at the University of Washington. Co-operating in the project is the Kodiak chapter of the United Fishermen of Alaska, which contributes \$1000 each year for equipment.

"You might call it a juvenile problem," says Nelson. "You see, the red salmon has a peculiar life cycle which requires it to spend its youth in the lake where it was



During migration, 50 young salmon are anesthetized daily for weighing, measuring and age determination

Everything from humans to lumber must be flown to the scientific fish laboratory in the Alaskan wilds





Fighting red salmon are captured to count scales for checking age. They are later returned to freedom

Measurements of migrating fish indicate an increase in length and approximately 20 percent in weight



spawned—in this case, Karluk Lake at the head of the Karluk River. A growing fish, like a growing boy, takes a lot of food, and research has revealed that the food supply in Karluk Lake has shrunk with the years. Why?

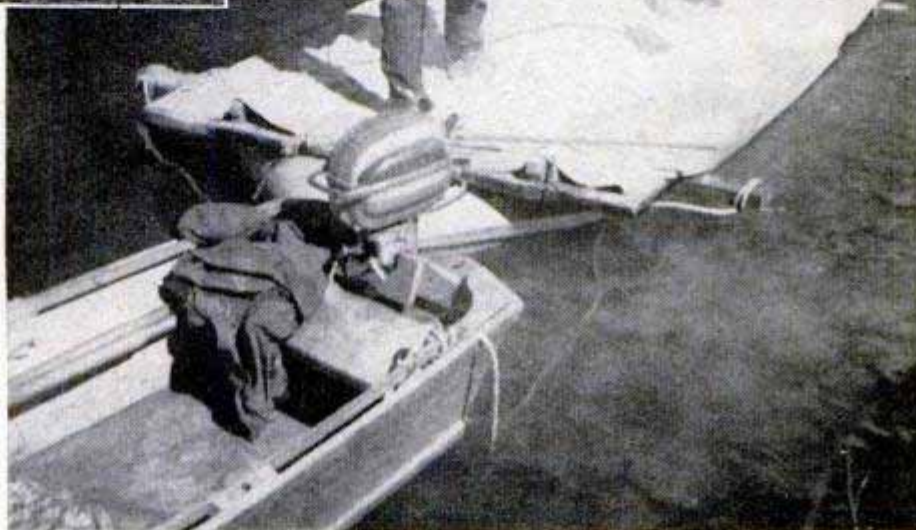
"Well, it's about as vicious a circle as you will find in wildlife. Before the days of the big catches, millions of red salmon used to spawn and die in Karluk Lake. Their decomposing carcasses provided the chemicals for the growth of phytoplankton, which is the microscopic plant life of the water. Phytoplankton is, in turn, the food for zooplankton, microscopic animal life upon which the juvenile red salmon feed. Less carcasses, less minerals, less plankton, less surviving juvenile fish, fewer big ones for the fishermen."

Could commercial fertilizers be profitably applied to Karluk Lake to step up the plankton growth and put the red salmon cycle back in high gear?

Farm fishponds had been successfully fertilized, but Karluk Lake is no pond. Twelve miles long and two wide, it has a total area of approximately $14\frac{1}{2}$ square miles. "Our research budget wouldn't let us bite off all that area," says Nelson, "so, for experimental purposes, we started looking for a smaller Kodiak lake with similar conditions. Bare Lake was the answer.



Three tents comprised the first headquarters at Bare Lake. Men with brooms, right, are sweeping fertilizer from raft into the lake



Rugged . . . but scientifically suitable.

Tests began there in 1950, and that's where young biologists like Hunter and Schroeder came in . . . the hard way. That first year, they merely pitched three tents beside the lake, and a violent wind raced down from the north one night to pitch two of the tents far across the tundra. Then the rain came, slashing at the remaining tent. Hunter and Schroeder huddled through the night beside a Coleman stove.

"A pleasant night," said Schroeder. "It was too rough for the mosquitoes to be about."

Life at Bare Lake, however, has improved for the two or three biologists who must spend four months of the summer there. Now there is a cabin, complete with an ancient Edison phonograph and almost equally ancient records.

Fertilizing the lake is actually about the easiest job on the biologists' work sheet. It is done twice each season.

Approximately 6500 pounds of sodium nitrate and 2500 pounds of 19 percent phosphate are added each year. To obtain an even distribution of the fertilizer, the lake is divided into 11 approximately equal sections by shore markers and buoys. After the fertilizer has been mixed on a platform atop a six-man rubber raft, it is towed by an outboard motor over the various sections. Two men on the raft with brooms sweep the mix into the lake. The job is completed in eight hours.

The possibilities are apparent. Feeding young fish in their natural habitat by fer-

tilizing a lake to stimulate plankton growth is much cheaper than feeding the young fish in a hatchery—if the system works.

The scientific mind is not only exacting but stubborn. Definite days have been set up for obtaining water samples on the fertilization progress, so, when a storm was chopping the lake on a water-sampling day, Hunter set out to get those samples.

Moored in the center of the lake is a raft with sampling apparatus. Hunter headed for it through the waves in a 10-foot plywood boat powered by a 3½-horsepower outboard motor. He never got there. The boat heaved, then turned turtle. Only a moderately good swimmer, Hunter knew he could never make it to shore. He clutched the bottom of the upside down boat, hung on and yelled.

From shore, Schroeder didn't hear, but saw Hunter's plight and jumped into the station's six-man life raft. Riding the lake like a cowboy on a bucking bronc, he rowed to Hunter and hauled him aboard. On that particular sampling, Hunter dutifully noted a slight differential in the time it was taken.

There are also fish tallies to be made on the streams linked to the lake. And that

(Continued to page 242)



Adjustable Japanese Bicycle Folds Into Small Package

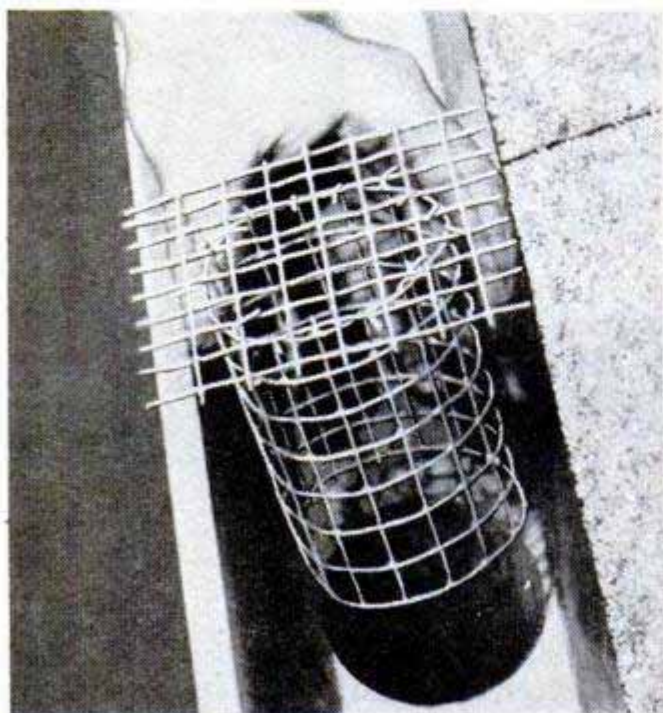
Manufactured in Japan, the Shimura "Road Puppy" bicycle, weighing 30 pounds, folds into a compact bundle measuring 24 by 20 by 12 inches. When opened, all joints

are sturdy enough to support the weight of a 200-pound rider. Adjustable handlebars and seat make it adaptable to riders of all ages.

Body-Heat "Radar" Detects Person 100 Feet Away in Dense Fog

So sensitive to heat radiation that it spots a person 100 feet away by his body heat, a new detection device will help the armed forces fight in the Arctic. The device was developed to locate soldiers lost in a "white out," which is a frozen fog or cloud of ice

crystals suspended in air. So dense is this frozen fog that persons become invisible in a few feet. With the heat detector, lost men are quickly spotted. As a defense aid, it would permit the discovery of enemy troops in the white out.



Downspout Screen

Leaves and debris which collect in eaves troughs are prevented from entering and clogging the downspouts by a simple wire guard. Inserted in the top of the spout, the guard lets water through but stops trash. Made of 1/2-inch mesh rustproof wire, the guard consists of a cylinder topped by a flat rectangle of wire screen. The guard is said to last the life of the gutter.

Transistors Speed Phone Calls

Transistors are helping speed long-distance telephone calls across the United States. The minute units form part of an electronic "translator" which receives numbers and then selects the proper routing card out of a stack of cards. The routing card reveals quickly how a call is to be dispatched to its destination.



Lilliputian Dutch City Thrills "Giant" Visitors

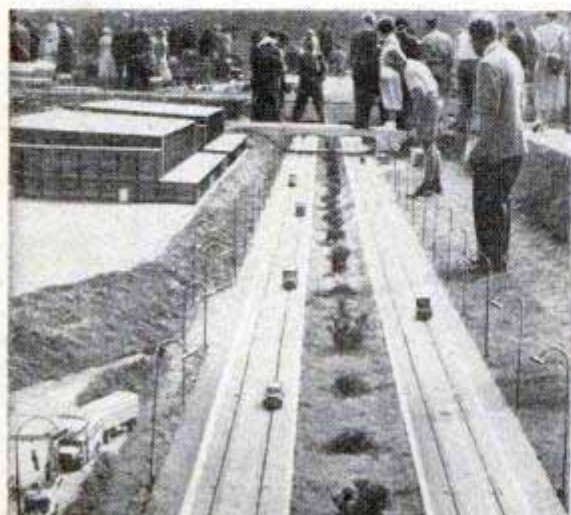
YOU'LL KNOW how Gulliver felt during his stay in Lilliput if you ever journey to the miniature Dutch city of Madurodam. Standing on an airport runway among planes of various nations or inspecting the adjacent village, railway and port installation, entranced visitors feel like giants. Created to a scale of $\frac{1}{25}$ normal size, the city includes faithful copies of many Amsterdam houses, factories and churches. There's even a faithful reproduction of the Peace Palace, which is located just a mile from the miniature city, in The Hague. Miniature cars move along a superhighway, a tiny ocean liner is docked in the harbor and a carillon in a church steeple chimes on the hour. At night the city is agleam with light, the airport beacon flashes and a movie marquee advertises the latest film.

Convair rests in airport as ground crew rushes to attend it and "giants" from outside world look on with curiosity. At night, airport gleams with landing lights and a beacon. Below, Dutch flagship passes oil depot at entrance to harbor



Below, left, trucks and automobiles move along superhighway at edge of the city. At right, stately old mansions (exact replicas of actual buildings in Amsterdam) are reflected in the water of the canal. Building of city took two years

Royal Dutch Airlines photos





Stable little catamaran is assembled by bolting the two deck units atop twin 19-foot aluminum canoes

A 12-year-old boy's ideas inspired this **“CANOE-CAT” FOR SPEARFISHING**

DURING A FISHING trip with his father, 12-year-old Michael Wilkie had an idea. “Dad, why couldn’t you fasten two canoes together some way with a deck? That way you’d have a steadier boat, with space for camping and fishing gear.”

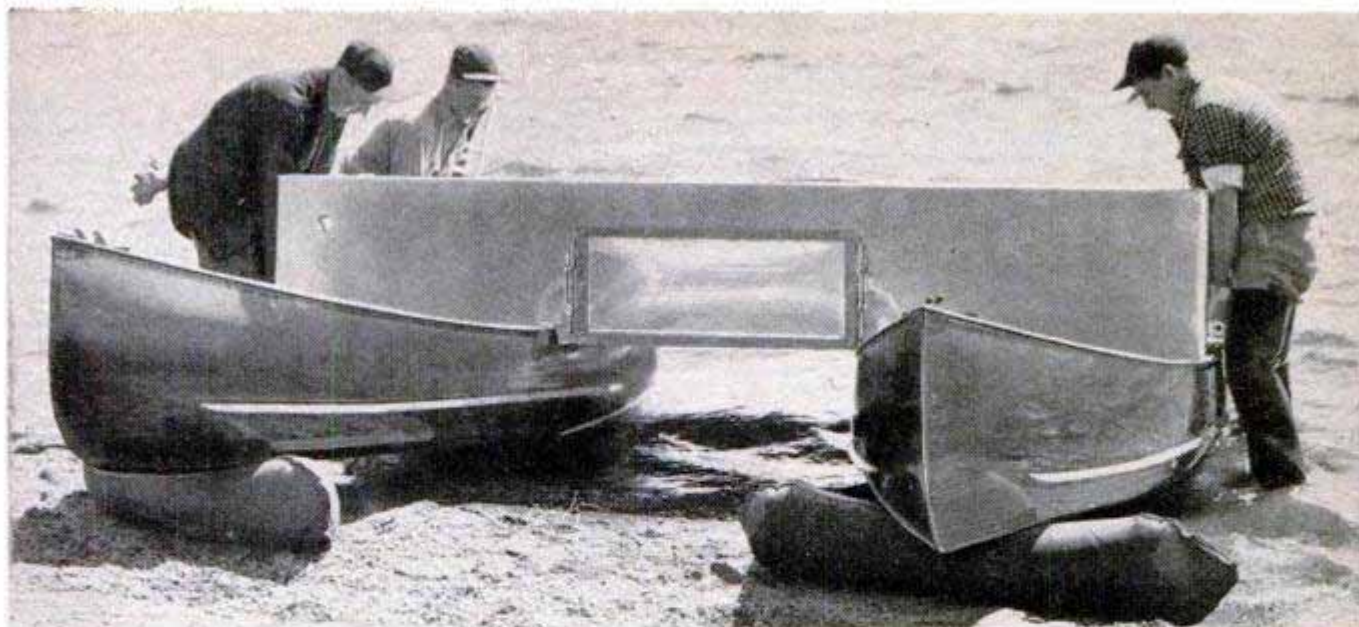
A few months later a trim little canoe-catamaran was launched. Under sail she was steady as a table top, even in a brisk wind. In addition to her sail, she carried an outboard motor on the stern of each canoe for auxiliary power. There was plenty of storage space and she’d carry a 1500-pound load in addition to five or six persons.

Young Michael’s father, Leighton Wilkie of Santa Barbara, Calif., had pitched the boy’s idea to an associate, W. T. Anderson, Des Plaines, Ill., who had drawn plans for the craft, then supervised the construction.

The entire catamaran including the two 19-foot canoes can be loaded on a medium-size trailer. On the bottom goes a 350-pound deck unit made with aluminum frame and a skin of sheet aluminum. The second or aft-deck unit is placed atop it. The twin, 112-pound aluminum canoes are lashed in place atop the load with the 24-foot aluminum mast between them.

Entire craft, which will carry six persons and 1500 pounds of gear, can be loaded on medium-size trailer





Canoes rest on cylindrical air bags until the "cat" is assembled, when a shove rolls craft into deeper water

At the launching site the two canoes are placed side by side at the water's edge, with their bows resting on air-inflated bags. The aft-deck unit then is slipped in place and bolted, the forward unit installed and the mast and boom erected. Just before launching, the sail is lashed to the boom and the two outboard motors installed on the canoes. When the craft is given a shove, it rolls on the cylindrical air bags until it floats free.

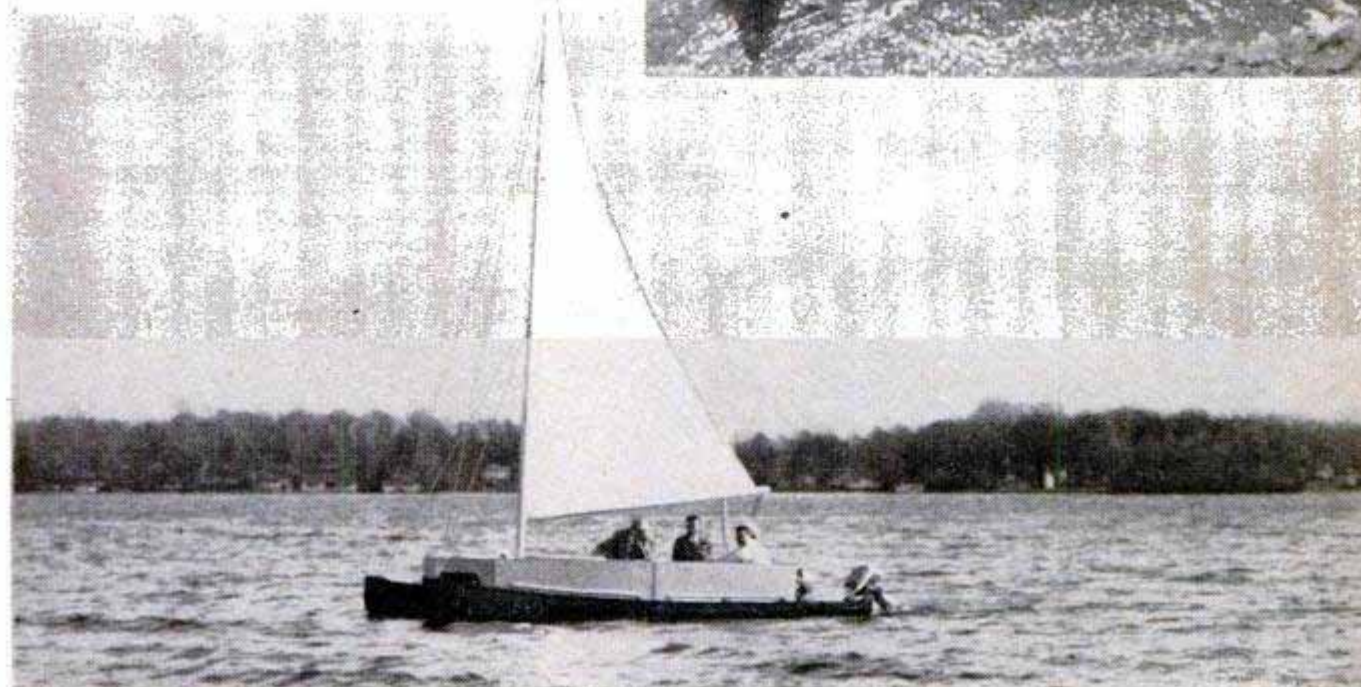
Because one of young Michael's hobbies is skin diving, an "aquadrome" has been built into the vessel. This is a transparent plastic section built into the deck for underwater viewing.

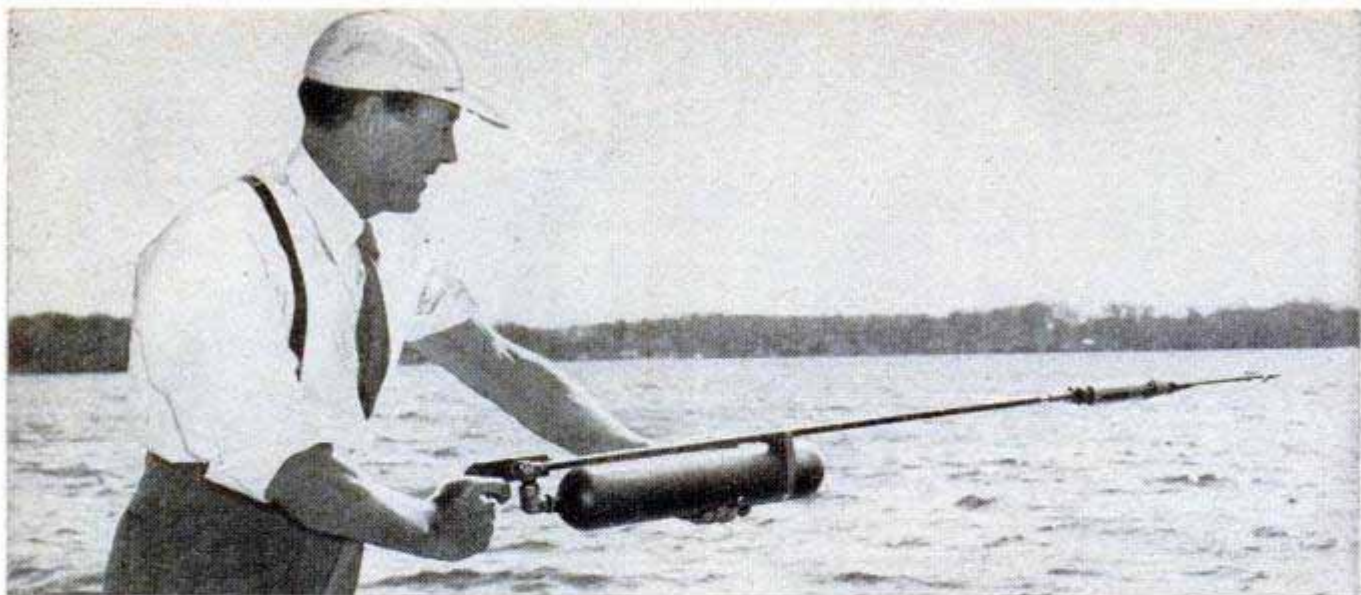
One of the advantages of the "canoe-cat" is that a fishing party can remove

Campers clamp on the motors and connect them to wheel

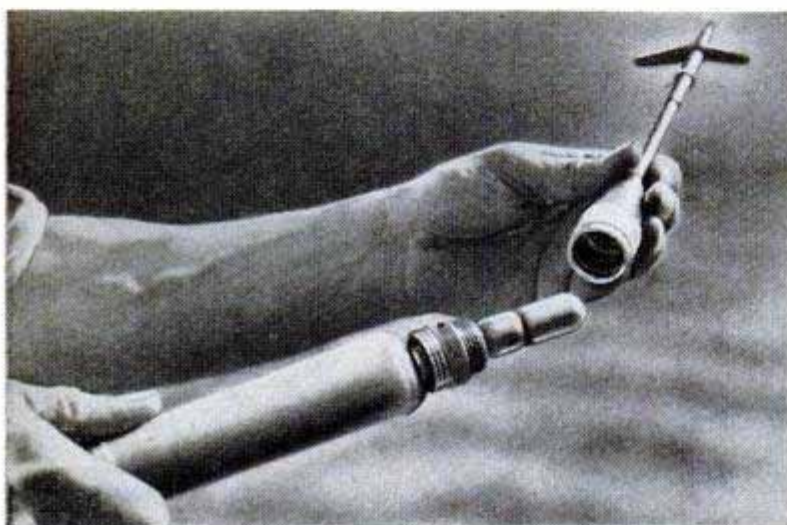


In brisk or light wind, "canoe-cat" handles nicely and is steady as a table top





Spear in fishing gun was the idea of Wilkie's son. It always floats to surface with or without a fish



Miniature cartridge of carbon dioxide slips into a socket in the shaft. As soon as the gun is fired, a needle in the shaft punctures cartridge, releasing gas into a plastic tube which inflates to bring spear to the surface. Below, young Michael, inventor, shows off barracuda he hit with "inflating" spear



the deck units at the camp site, leaving two canoes available for fishing. The deck units then serve as waterproof and animal-proof storage for camping gear. Further, the craft is virtually unsinkable because the deck units are lined with a plastic foam that makes them buoyant even if they should be swamped.

Michael also has come up with an idea for the sport of spearfishing. He suggested that an air bag somehow be built into the spear. Thus, when a fish was hit, the bag would lift it to the surface where it could be picked up easily; if the spear missed its mark, it would float for quick recovery.

The spear was developed with the aid of his father and Anderson. It is fired from a conventional spear-fishing gun which operates from a tank of carbon dioxide. The tank holds enough gas for 70 shots and drives the spear with enough force to pass completely through a piece of $\frac{1}{2}$ -inch plywood at a distance of 50 feet.

Built into the shaft is a socket which holds a carbon-dioxide cartridge. Wrapped tightly around the shaft is a plastic tube 36 inches long. When the gun is fired, a needle immediately penetrates the CO₂ cartridge, releasing gas into the tube. The shaft moves so fast that it either strikes or misses the target before the tube is inflated enough to start unwinding. As the tube fills with gas, the spear floats to the surface—with or without a fish, depending upon the aim of the fisherman. ★ ★ ★



Out to sea go these Danish youngsters, sailing on a broken-down wreck of a boat and very active imaginations

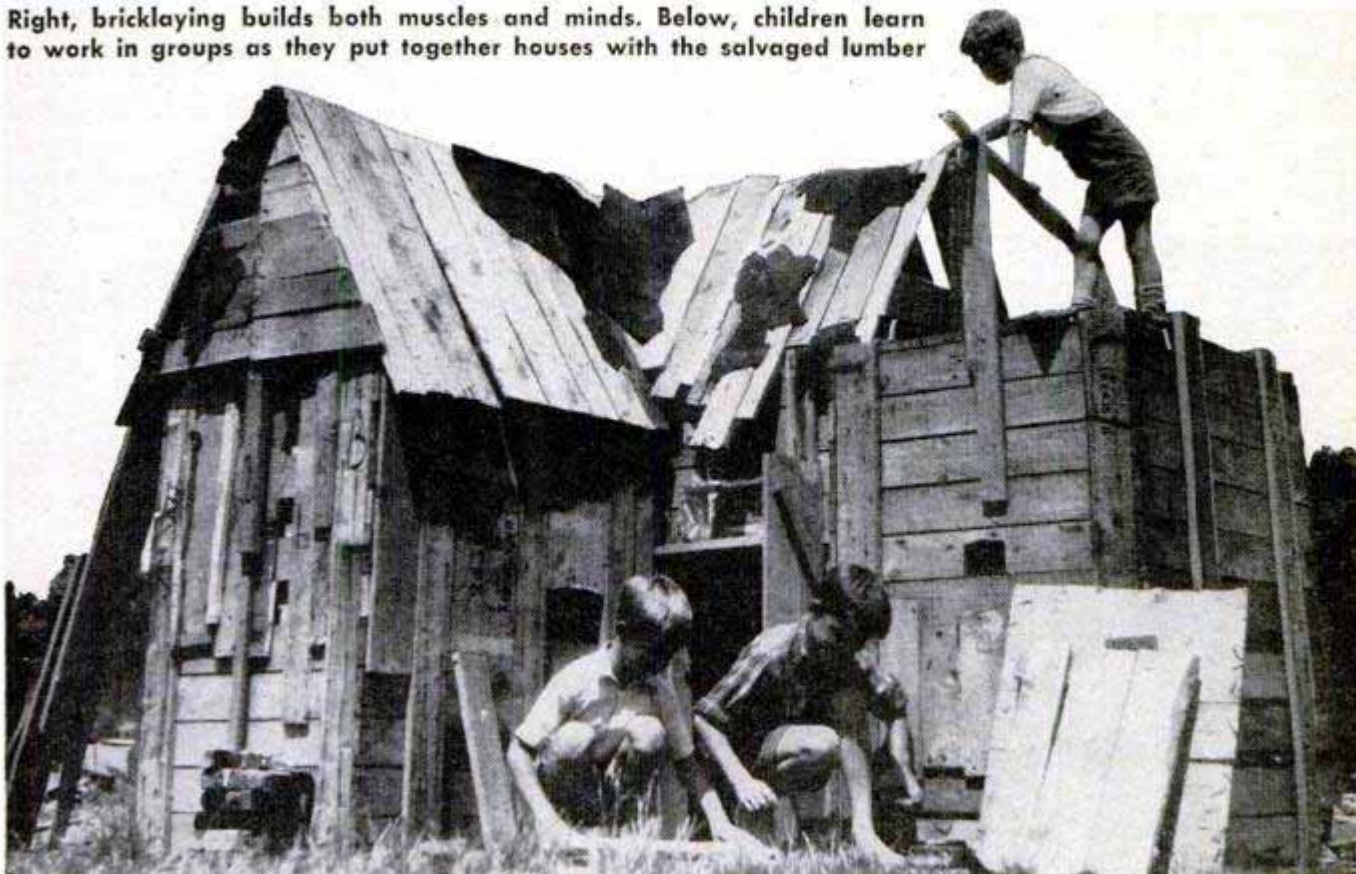
Junk-Yard Playground

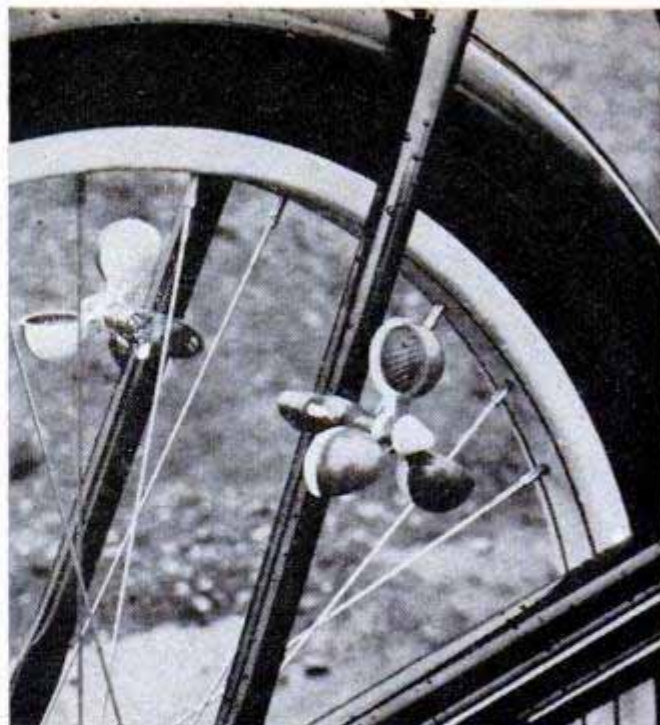
YEARS AGO, the city of Copenhagen, Denmark, built a playground with all the newest equipment. City officials were shocked to find it deserted most of the time. The youngsters preferred a junk yard.

Later when another playground was planned, the officials, remembering the junk yard, leveled off some land and told the children to bring in whatever they wanted. Today it is the city's most popular playground. In it, youngsters sail boats, build castles, drive cars and do just about everything—thanks to a collection of what older and wiser folks call junk.



Right, bricklaying builds both muscles and minds. Below, children learn to work in groups as they put together houses with the salvaged lumber





Windmill Reflectors Flash Warning to Protect Cyclist

Whirling like a propeller as the bicycle moves along the highway, a three-bladed windmill reflects light from automobile headlights and serves as a flashing warning light. Three red reflector buttons are mounted in the arms of the windmill. The

flashing red reflections are easily seen from a distance by the motorist. During the day, the device makes an interesting ornament that spins as the bicycle moves. It can be mounted on front or back of the bicycle, singly or in pairs.

Plastic Tripod-Tee for Golf Ball Rests on Top of Ground

Made of a tough but flexible plastic, a tripod serves as a golf tee. The ball rests snugly in a countersunk hole on top and the legs don't have to be pushed into the ground or sod to make the tripod stable. The height of the tee can be adjusted by spreading the legs or by cutting off their tips with a scissors. The plastic tripods are bright red and yellow.

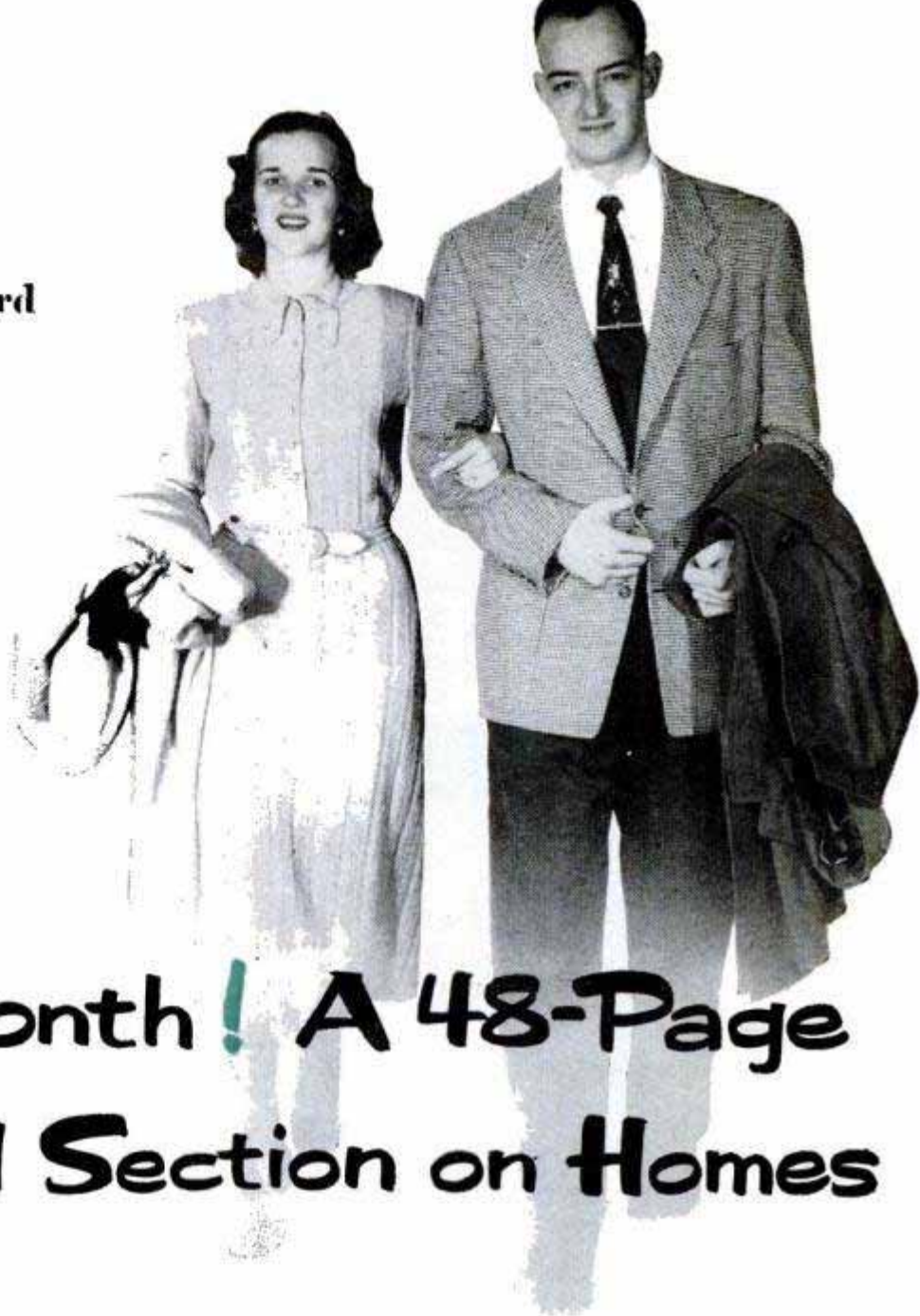


Motorized Reel of Steel Cable Clears Drain Obstructions

Resembling a large portable electric drill, a motorized reel of steel cable removes drain obstructions from lavatories, bathtubs and sinks. Approximately 25 feet of $\frac{1}{4}$ or $\frac{5}{16}$ -inch steel cable is coiled on a reel encased in front of the handle and motor. The cable's spiral tip can be threaded through sieves or crossbars at the drain entrance. Reversing the motor rewinds the cable onto the reel.



Jane and Don Engelhard
wrote us a letter . . .
Newlyweds in June,
they are looking
forward to a home
of their own. They
asked for advice:
Our answer will
appear in *PM* . . .



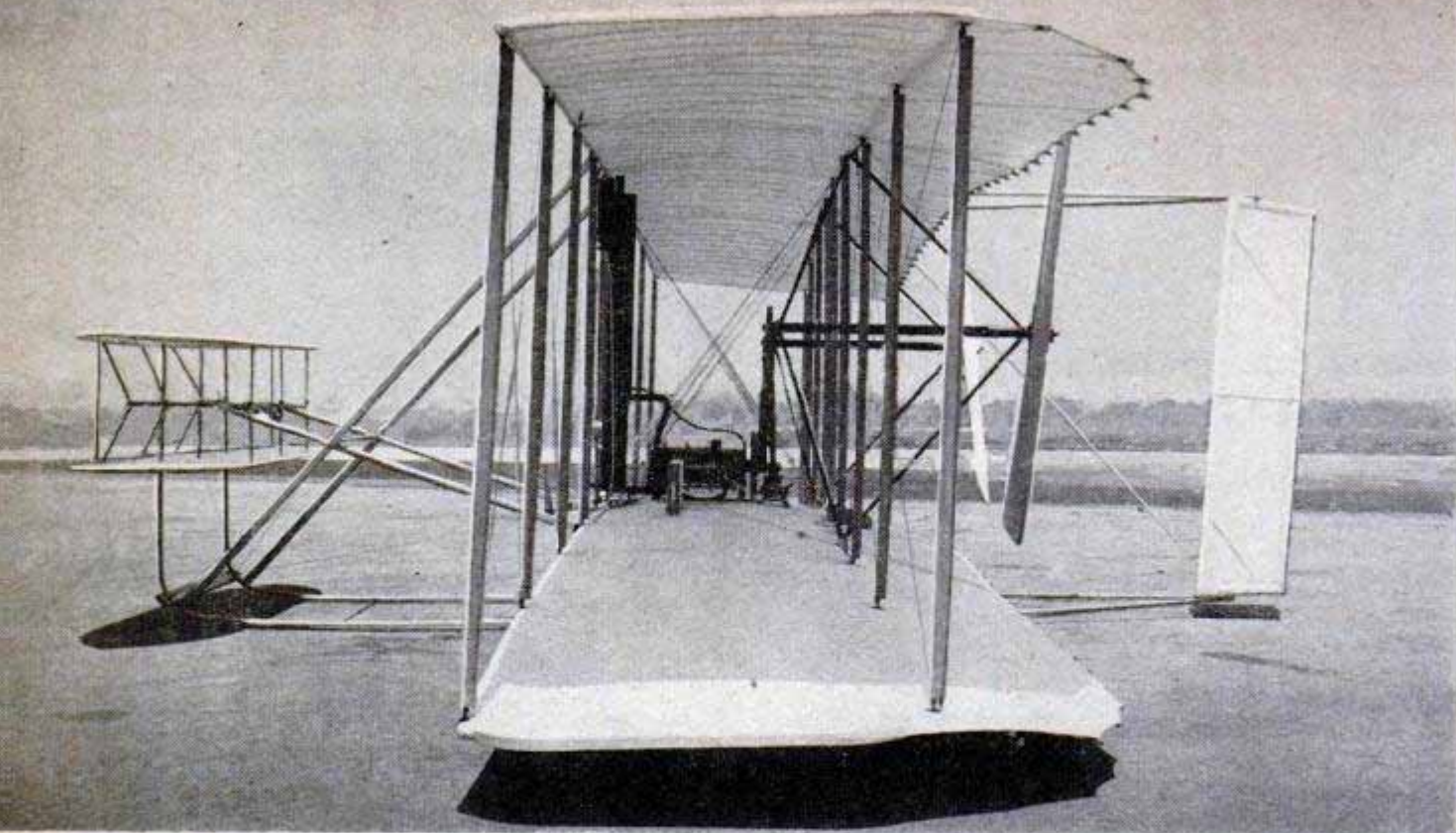
Next Month! A 48-Page Special Section on Homes

- How to plan your new home
- How to fix up your old home
- Eight pages of popular homes—*In Full Color*
- Architects and builders discuss your problems
- How you can save with a prefab
- What's new in wall coverings
- How to finance your home
- Mass housing—what it offers you

If you own your home . . . if you want to build or buy—

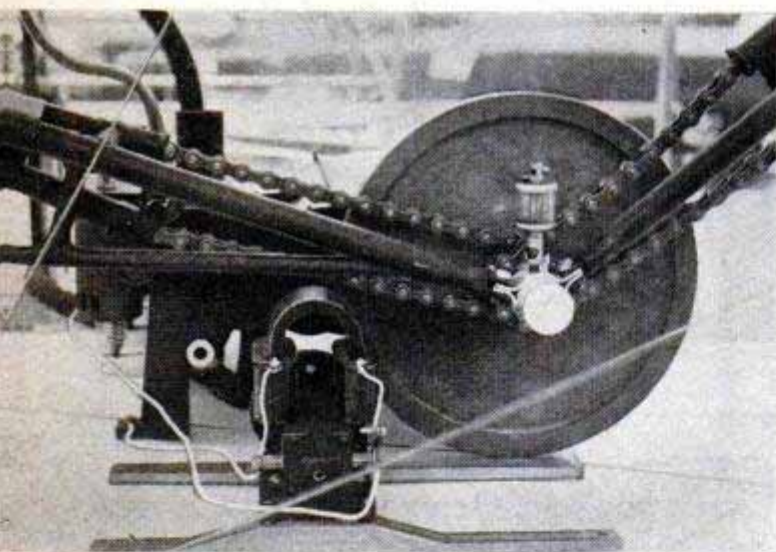
**DON'T MISS OUR ANSWER TO
JANE and DON ENGELHARD and YOU
in the GIANT HOME SECTION of
OCTOBER* POPULAR MECHANICS**

* on the newsstands September 29



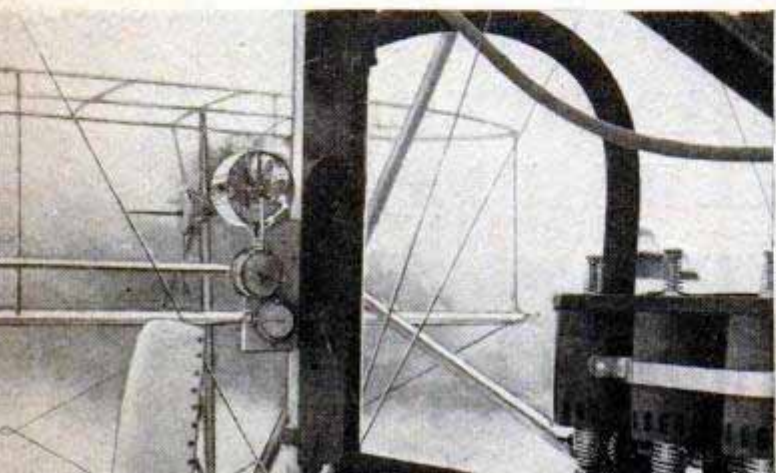
Muslin covers the spruce skeleton of the replica. The runners, its simple "landing gear," are made of ash

Air Students Build Replica of



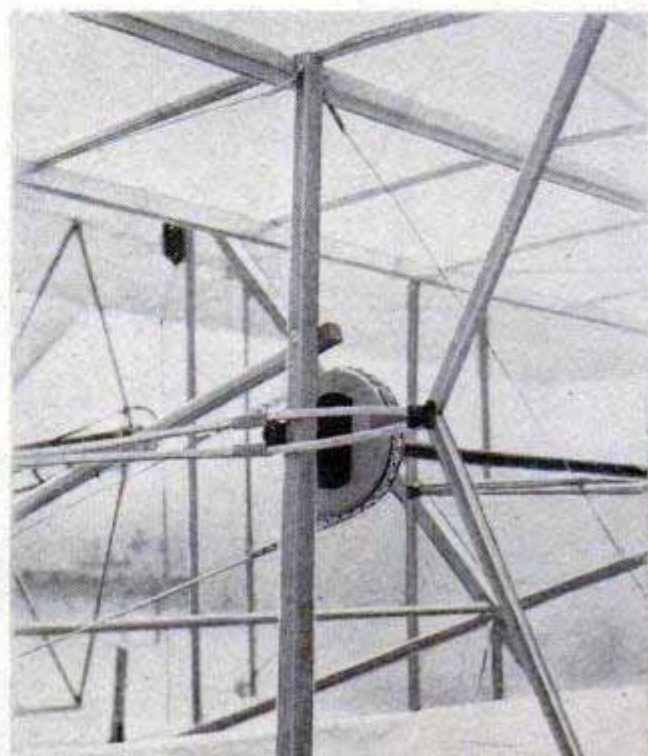
Rear view of engine, a metal-and-wood mockup. Small oil cup lubricated the outboard crankshaft bearing

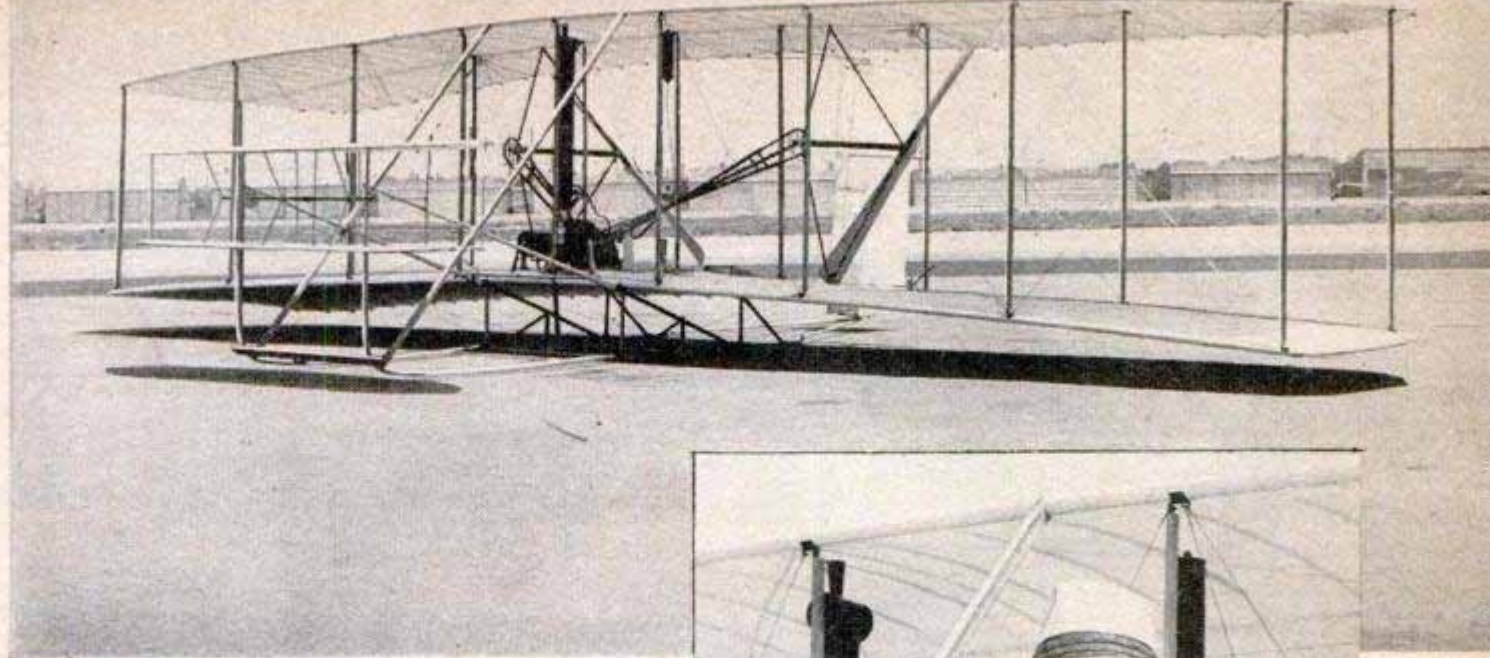
Delicate anemometer assembly and stopwatch below it were only panel instruments first pilot had to watch



IN RECOGNITION of powered-flight's fiftieth anniversary, 23 aircraft-industry groups teamed up to build a full-scale replica of the original Wright Brothers plane for the Institute of Aeronautical Sciences. Old dies were brought out of retirement to manufacture the many chains used in the replica and an anemometer was located in Paris that was similar to the one made there for the Wrights. A motorcycle hub like the

Control surfaces were moved by a chain-and-pulley system. The two propellers were also chain-driven





Wing droop, believed by the Wrights to give better stability, is about eight inches from center to wing tip. Hand-drawn wire was used throughout rebuilding

Builder of the engine for the original Wright plane, Charles Taylor is now 85 and living in Los Angeles

Wright Plane

one used as a roller for the original launching was reproduced by another company. At the dedication was Charles Taylor, builder of the original engine and long the chief mechanic for the brothers. Wingspan of the craft is 40 feet 4 inches and its empty weight is 600 pounds. Assembly of the copy of the first successful heavier-than-air machine was done by the aviation students at the Northrop Aeronautical Institute at Hawthorne, Calif.

★ ★ ★



Aviation students fabricated the complete wing panels and did all the final assembly and rigging chores





Venezuelan Builds Home on Stilts to Get Shaded Patio

Comfort, not refuge from floods, was the object of a homebuilder in Venezuela who constructed his new house on sturdy stilts. By raising the boxlike house approximately eight feet above ground he has a completely

shaded, open-air patio all year, plus four-way circulation on hot nights. There are no windows to wash, either—blinds, which fit into window openings, swing out for light and ventilation.

Mineral-Removing Resins Soften Water for Batteries

Demineralized water for storage batteries is obtained quickly by shaking regular tap water inside a plastic bottle that contains certain resins. These mineral-removing resins look like a fine grit. The flexible plastic bottle is sold with enough resin inside to demineralize eight gallons of water. In addition to its use in storage batteries, the softened water is ideal for photographic purposes.

Infrared Photo Plates Increase Power of Telescope

Improved infrared-sensitive photographic plates are so fast that they will give the 200-inch Hale Telescope on Mount Palomar as much space-penetrating power as a 900-inch model. The improved products have been made possible by the development of a new sensitizing dye in the infrared range. The speed of the new plates is such that the four-minute exposures previously required need only 12 seconds now.

Improved Rifles and Grenades Issued to British Army



British Information Services photo

New weapons are being issued to British infantry units to replace some of the widely known small arms which the Tommies have used for years. The weapons include a 7-mm. self-loading rifle—called the Patchett machine carbine—which will replace the Sten gun. Another new weapon is an antitank grenade which is fired from a standard service rifle. Weighing only 21 ounces, the grenade is said to be as destructive as antitank guns of the last war.

Ⓞ Weighing only 132 pounds, a magnesium body for automobiles has been built in England and, in production, it may be cheaper than the plastic body.



Detroit Listening Post

By Leo Donovan

UNTIL LATE THIS SUMMER, it was conceded that 1954 would be another "face lift" year in the industry, with only identification changes apparent to the buying public.

Now it seems that Cadillac and Oldsmobile, and probably the line of big Buicks, will come out with major engineering changes in 1954 models.

Tool and die shops in Detroit and other cities have been busy for months preparing new mass-production tools for 1954 cars.

Every year since the war's end, the car makers have publicly lamented the possibility that new models would be delayed because tooling couldn't be finished in time. In some instances their tears were justified, but for the most part, the programs were completed on schedule.

This year is no exception. Chrysler, which feared its 1954 introduction would have to be postponed, apparently will be first on the market with its new cars.

Although production of sports cars and sports-type cars failed to reach the volume manufacturers had hoped for, mass output of the Chevrolet Corvette, the Packard Pan American, the Buick Skylark and the Nash and Hudson sports cars is planned for early in the season next year. Market reports show that the public is willing to buy these cars and that volume investment will bring rewards.

General Motors has enjoyed so much success with its annual Motorama in New York that this winter's extravaganza will display the most sensational changes yet.

Engineering highlight of the show is expected to be a gas-turbine engine, harbinger of future sports-car power plants. Contrary to the arguments of most automotive engineers for the last 10 years, the engine will be in the rear. How the problems of heat dissipation, noise and fuel economy are solved in the new engine is still a mystery. At least, it is still secret to the public.

Veteran engineers confide that the linkage-type power-steering unit is little more than a glorified shock absorber, but is more reliable and efficient than the so-called integral type.

They expect power steering will grow in

popularity so fast that it will be standard equipment sooner than the automatic transmission. The price is bound to come down, too, as mass-production costs are scheduled downward. Another price competitor is a packaged power-steering kit for installation (at first) on big used cars like Cadillac, Lincoln and Packard. These units that the dealer can install to make used cars more attractive will be cheap enough to push factory-installed units down in price.

The used-car problem is still the auto industry's principal cause for concern. The midsummer price slump caught a lot of used-car dealers with inventories they couldn't dispose of except at a loss.

Particularly concerned are the independent manufacturers whose used-car trade-in values drop more sharply than those of the Big Three. Actually, that large segment of the motoring public which invests in used cars has a better opportunity this year than in any recent year to get good merchandise at bargain prices. If you know how to buy a used car, you can get cheaper transportation than has been available since 1941.

The most completely equipped used car, even with dealer-installed power steering, will be hard to sell if manufacturers cut new-car prices by eliminating extras.

Dealers believe that customers may buy the new cars without backup lights, directional signals (except where state laws require them), expensive radios, bumper guards, etc., but the buyers will be installing them on their cars in a few months—especially if they got used to them on their old cars.

Henry Ford II was reported a few years ago to have gone up and down the assembly line in the Rouge plant after the workers had left for the night. He was slamming car doors and marking for correction those with a "tinny" sound.

Body engineers at the summer SAE meeting agreed that Ford's was a sound practice. The public apparently prefers the clunk to the tinny clank and it takes only a slight application of sound deadener to give the door a solid sound that convinces buyers the car is well made.

Monroe Auto Equipment Co.
Monroe, Mich.

AVERAGE OWNER GETS
21 MILES TO
GALLON IN COUNTRY

77% OF ALL
OWNERS RATE
HANDLING
EXCELLENT

1. I own a 1953 Studebaker: Champion ☒ Commander ☐ Land Cruiser ☐
 It has the low, hardtop styling ☒ The family sedan styling ☐ Speedometer reading: 35 49
 2. It has conventional transmission ☐ Overdrive ☐ Automatic drive ☒
 3. I use regular gasoline ☐ premium (high test) gasoline ☒
 4. Average gasoline mileage in city 17 m.p.g.; in country 20 m.p.g.
 5. I add 0 quarts of oil in 1000 miles. I change oil every 1000 miles.
 6. Roadability*: Excellent ☒ Good ☐ Unsatisfactory ☐
 7. Handling*: Excellent ☒ Good ☐ Unsatisfactory ☐
 8. Structural rigidity*: Excellent ☐ Good ☒ Unsatisfactory ☐
 *For an explanation of these terms see other side of sheet

SPRINGFIELD, MASS.,
ACCOUNTANT

9. Acceleration from a standstill:
 From 50 miles per hour: Excellent ☐ Good ☒ Unsatisfactory ☐
 10. My reasons for buying a Studebaker: Like its styling, performance, gas mileage and excellent preciseness of steering.
 11. If you own or have tried Studebaker power steering do you feel it is worth the extra cost? Yes ☐ No ☐

ONLY 3% SAY
STYLING TOO DRASTIC

The OWNERS

11. If you own or have tried Studebaker power steering do you feel it is worth the extra cost? Yes ☐ No ☐
 Comment: Have not tried it but feel it is not worth the extra cost.
 12. How do you rate Studebaker's new Continental body styling?
 Excellent ☒ Good ☐ Too drastic ☐
 Comment: Believe they are way ahead in design

13. Rate these points:
- | | | | |
|------------------------|--|--|----------------------------------|
| Visibility, forward: | Like <input checked="" type="checkbox"/> | Acceptable <input type="checkbox"/> | Dislike <input type="checkbox"/> |
| Visibility, rear: | Like <input checked="" type="checkbox"/> | Acceptable <input type="checkbox"/> | Dislike <input type="checkbox"/> |
| Riding qualities: | Like <input checked="" type="checkbox"/> | Acceptable <input type="checkbox"/> | Dislike <input type="checkbox"/> |
| Horsepower output: | Like <input checked="" type="checkbox"/> | Acceptable <input type="checkbox"/> | Dislike <input type="checkbox"/> |
| Exterior body styling: | Like <input checked="" type="checkbox"/> | Acceptable <input type="checkbox"/> | Dislike <input type="checkbox"/> |
| Interior body styling: | Like <input type="checkbox"/> | Acceptable <input checked="" type="checkbox"/> | Dislike <input type="checkbox"/> |
| Interior head room: | Like <input type="checkbox"/> | Acceptable <input checked="" type="checkbox"/> | Dislike <input type="checkbox"/> |

TOLEDO, OHIO,
ENGINEER

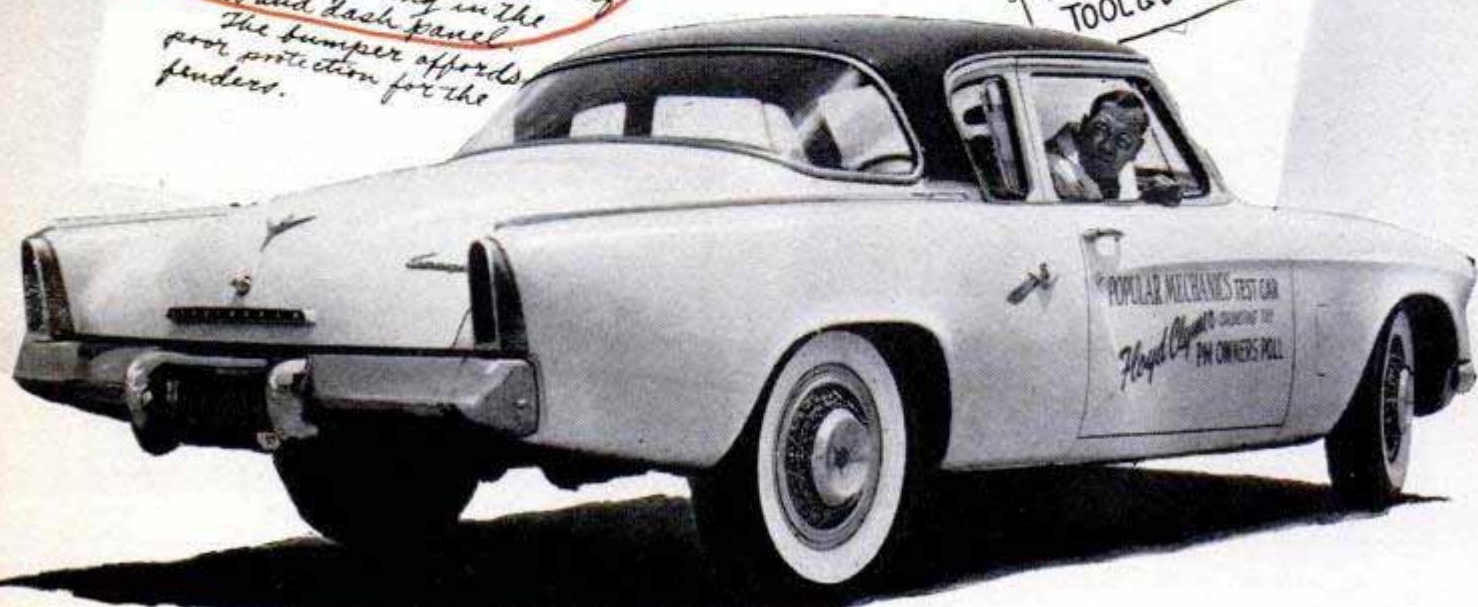
14. Specifically, what are your complaints? Rattles in doors. Hardware and instrument panel could have been fitted closer + tighter

POOR-FITTING DOORS
IS BIGGEST COMPLAINT

15. Have you ever owned a Studebaker before? Yes ☒ No ☐ How many? one
 16. Would you buy another Studebaker? Yes ☐ Possibly ☒ No ☐
 17. How is your dealer service? Excellent ☐ Good ☒ Average ☐
 18. An over-all rating of your Studebaker: Excellent ☐ Good ☒ Average ☐

My only real complaint is of very poor fitting in the doors and dash panel. The bumper affords poor protection for the fenders.

PHOENIX, ARIZ.,
TOOL & DIE MAKER



POPULAR MECHANICS TEST CAR
Floyd Clymer
2ND OWNERS POLL

Studebaker owners, the poll shows, are proud of their cars' styling. From any angle, side or rear (see facing page), it's sleek and clean



REPORT on the STUDEBAKER

The true test of a car begins when the owner takes the wheel. Popular Mechanics sent questionnaires to 1000 Studebaker owners. Here is what they say

By Floyd Clymer

STUDEBAKER OWNERS are proud of their cars—proud of the styling that makes heads turn wherever they go. Never in our series of Owners Reports have we received such a large response as from 1953 Studebaker owners. They're anxious to talk!

Naturally, the new continental-body styling was the most popular subject. Of the owners replying to our questionnaires, 75 percent rated the styling excellent; 22 percent rated it good; and 3 percent said it is too drastic.

Studebaker this year has two different body lines in each series (Champion, Commander or Land Cruiser). One is longer, lower and sportier. It is known as the hardtop or sport line. The other is the sedan or family line. It is shorter, higher, has more interior room, more usable trunk space, and is available as two-door and four-door sedans. Both hardtop and family bodies have similar contouring and characteristics. (See specifications chart.)

Hardtop owners are, understandably, most enthusiastic about body styling. Here are some typical comments:

"Best-looking U.S. car on the road."—Flemington, N. J., fur salesman.

"Designed to look like a moving object. Pleasingly simple and fresh."—Downers Grove, Ill., art director.

"More people have stopped and admired my car than any other I ever owned."—Phoenix, Ariz., sales manager.

"The main reason I bought one."—Fairfield, Ill., service-station owner.

"Easy to wash and wax without a step-ladder."—McCook, Neb., retired farmer.

"I am complimented on it everywhere I go."—Washington, D. C., telephone man.

Family-sedan owners were enthusiastic also, but there was a scattering of complaints about the continental styling.

"Low windows required getting used to them. Once accustomed, one would never want to go back to the old style."—Medford, Mass., chemical engineer.

"Looks like a sport car and yet the sedan makes a good family car."—Harper Woods, Mich., wholesale druggist.

"Cuts wind noise and resistance."—Kansas City, Kans., newspaperman.

"Trunk too small."—Milwaukee, Wis., stock clerk.

"Hood swoops too sharply."—Milwaukee, Wis., electrician.

"Sacrifices comfort for style."—Los Angeles housewife.

"Prefer sedan styling for comfort."—writes a Glen Ridge, N. J., manufacturer's representative.

The biggest complaint throughout the line was poor body assembly and fitting. Specifically, the most complained-about body feature was the doors. This complaint was voiced by owners of both hardtop and family styles and both six and eight-cylinder engines.

As one Land Cruiser owner put it, however, there is an explanation for it. "I have no complaints other than criticism of body and interior details caused by new-body-itis."—Arlington, Va., printer.

Many owners mentioned that dealers were correcting the body "bugs" so often associated with new designs.



Studebaker owners from 20 states (shown on map) tell you what they think about their new cars

Percentages from PM Poll of Studebaker Owners

Champion 6 owners reporting: 62%

Commander V8 owners: 29%

Land Cruiser V8 owners: 9%

ALL STUDEBAKER OWNERS REPORTING

Average speedometer mileage.....	3686
Owners of overdrive-equipped cars.....	66%
Automatic Drive cars.....	24%
conventional transmission cars.....	10%
Previous Studebaker owners.....	74%
Owners of five or more Studebakers previously.....	11%
Dealer service excellent.....	48%
good.....	23%
average.....	17%
poor.....	12%

RATING OF STUDEBAKER'S CONTINENTAL STYLING

Excellent.....	75%
Good.....	22%
Too drastic.....	3%

RATINGS ON PARTICULAR FEATURES

	Like	Acceptable	Dislike
Visibility, forward.....	98%	2%	0
Visibility, rear.....	94%	5%	1%
Exterior styling.....	89%	10%	1%
Riding qualities.....	74%	24%	2%
Interior styling.....	72%	25%	3%
Interior head room.....	59%	35%	6%

CHIEF PURCHASE REASON

(in order of frequency)

1. Economy and gas mileage
2. Trade-in allowance
3. Styling features
4. Previous Studebaker ownership
5. Driving ease (roadability and handling qualities)
6. Riding qualities (comfort, etc.)
7. Engine and performance
8. Price of the car

STUDEBAKER OWNERS BY MODELS

Average miles per gallon—	Champion 6	V8 models
city.....	18.3	14.1
country.....	21.0	18.2
Roadability		
excellent.....	72%	79%
good.....	26%	20%
unsatisfactory.....	2%	1%
Handling		
excellent.....	76%	78%
good.....	21%	18%
unsatisfactory.....	3%	4%

Structural rigidity	Champion 6	V8 models
excellent.....	32%	40%
good.....	53%	47%
unsatisfactory.....	15%	13%
Acceleration from standstill		
excellent.....	22%	64%
good.....	66%	33%
unsatisfactory.....	12%	3%
Acceleration from 50 m.p.h.		
excellent.....	33%	62%
good.....	61%	36%
unsatisfactory.....	6%	5%
Would buy another Studebaker?		
yes.....	72%	72%
possibly.....	21%	23%
no.....	7%	5%
Over-all rating of car		
excellent.....	54%	59%
good.....	35%	30%
average.....	7%	7%
poor.....	4%	4%
Most frequent complaints of Champion hardtop owners		
Interior room and comfort.....	18%	
Body workmanship.....	18%	
Lack of power.....	15%	
Location of rear armrest.....	9%	
Most frequent complaints of Champion family-sedan owners		
Body workmanship.....	18%	
Lack of power.....	18%	
Rattles.....	13%	
Interior room and comfort.....	10%	
Dash reflections.....	3%	
Most frequent complaints of V8 hardtop owners		
Interior room and comfort.....	15%	
Hard steering.....	12%	
Rattles.....	6%	
Body workmanship.....	6%	
Most frequent complaints of V8 family-sedan owners		
Body workmanship.....	29%	
Interior room and comfort.....	10%	
Rattles.....	8%	
Poor economy.....	5%	
Percentage of owners with no complaints at all		
Champion hardtop owners.....	27%	
Champion family-sedan owners.....	27%	
V8 hardtop owners.....	40%	
V8 family-sedan owners.....	33%	

Champion Comments

Owners of the Champion hardtop models complained about interior room and seating comfort as much as they did about body workmanship—18 percent in each category. Incidentally, 27 percent of all Champion owners couldn't think of a single thing to complain about.

"The Champion's hardtop styling is too low—you have to fall in and climb out."—Fort Atkinson, Wis., engineer.

"The permanent armrest in the rear seat should fold."—Richmond, Va., soldier. (This cannot be done. The propeller shaft runs through the lower portion of the armrest in the hardtop models. If you take out the armrest you won't have any padding

or springing in the center of the rear seat.

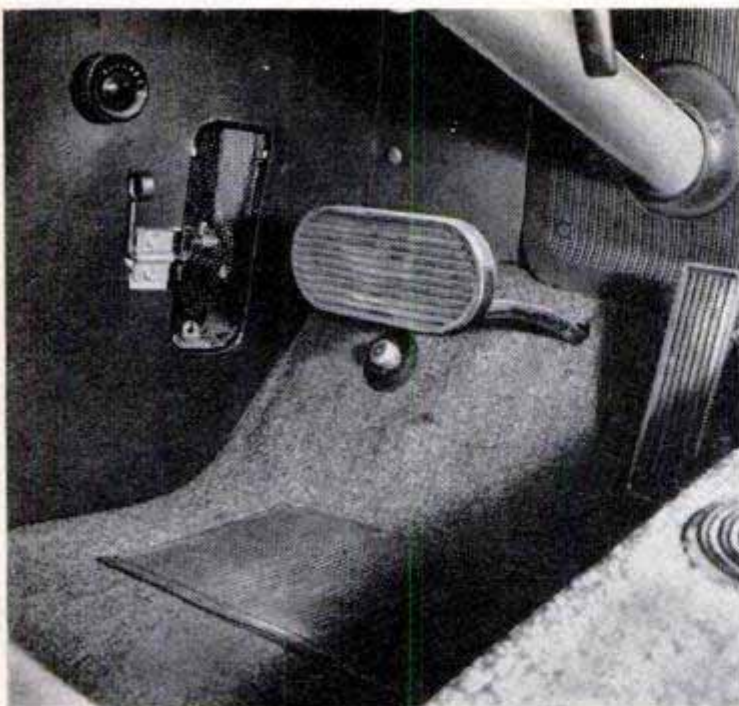
"You sit too close to the floor which is hard on your legs and end of spine."—Waukesha, Wis., pattern maker.

"Sacrificed too much of the springs and padding in cushions to lower the seats and give headroom. Right leg gets tired after long drives from not having support of cushions normally present in other cars."—Barnwell, S. C., hardtop owner.

Champion owners of both sedan and hardtop models complained that the smaller car lacks power.

"Complete lack of any acceleration at any speed."—Detroit, Mich., factory worker.

"Not enough pickup in a tight spot. Must have more space to pass than any other



Automatic Drive models have wide brake pedals. Also visible is air vent and knob to raise radio antenna



Although the seat is close to the ground, doors have a normal curb clearance of 12 inches, Clymer reports

car."—a Manitou Springs, Colo., finisher.

"At times greater power would be appreciated, but I can always change to the V8 and have it."—Tucson, Ariz., service representative, offering a logical solution.

Champion owners were less than enthusiastic about body rattles and structural rigidity (the ability to travel rough roads without excessive body shake). For details see Percentages from PM Poll on page 100.

Here are some miscellaneous comments by owners of 1953 Champions:

"This hardtop Champion is beautiful. I would like to afford a real sports car but at

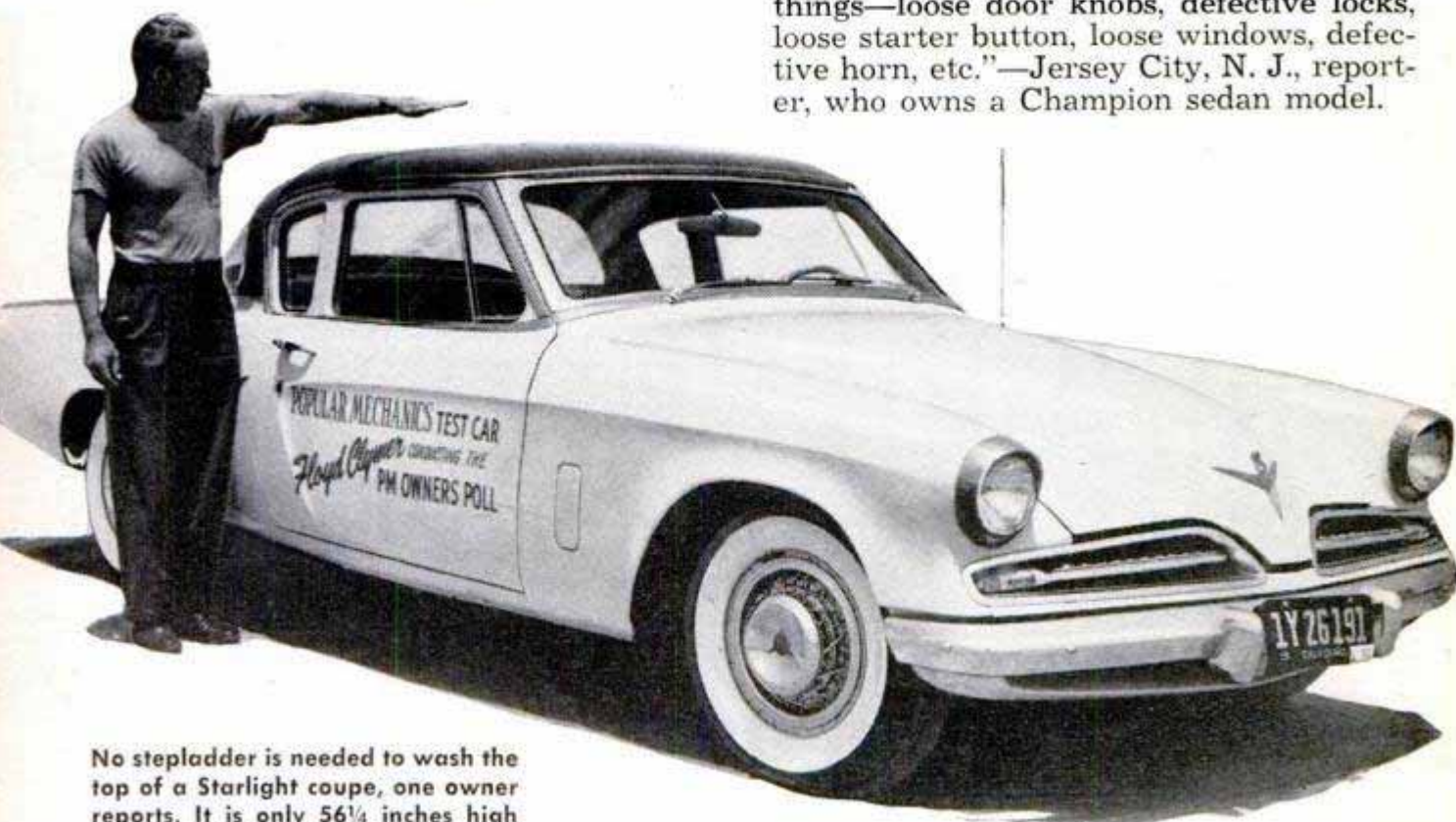
present they cost just a little too much."—Calumet City, Ill., electrician.

"The rear of the Champion (family sedan) is so light it bounces."—Brooklyn, N. Y., salesman.

"When the sun hits the dashboard, the reflection on the chrome is dazzling."—Flushing, N. Y., electrician.

"The Champion (family sedan) is the first car in which I could see the road since the Model A."—Mesa, Ariz., draftsman.

"Over-all, the Studebaker performs well in the major things but fails in the minor ones. The complaints are little annoying things—loose door knobs, defective locks, loose starter button, loose windows, defective horn, etc."—Jersey City, N. J., reporter, who owns a Champion sedan model.



No stepladder is needed to wash the top of a Starlight coupe, one owner reports. It is only 56¼ inches high



Some owners say driver's position is bad but Clymer disagrees. Below, as low as it is, the car has adequate road clearance



ACCELERATION TEST

1953 STUDEBAKER COMMANDER V8 REGAL STARLIGHT COUPE
WITH AUTOMATIC DRIVE

¼ mile from zero	(Drive only)	21.9 sec.
	(Low and Drive)	20.8 sec.

½ mile from zero	(Drive only)	33.6 sec.
	(Low and Drive)	32.8 sec.

0 to 30 m.p.h.	(Low only)	5.1 sec.
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0 to 60 m.p.h.	(Drive only)	17.9 sec.
	(Low and Drive)	17.2 sec.

(In tests using both Low and Drive shift was made
at about 30 m.p.h. with throttle wide open)

Top speed (by speedometer).....103-105 m.p.h.
Actual top speed about 6% less (speedometer variation)

ECONOMY TEST

MILES PER GALLON

Constant-Speed Mileage

At constant 30 m.p.h.	- - - -	26.1 m.p.g.
At constant 50 m.p.h.	- - - -	19.9 m.p.g.
At constant 60 m.p.h.	- - - -	18.5 m.p.g.
At constant 75 m.p.h.	- - - -	15.1 m.p.g.

Cross-Country Mileage

South Bend, Ind., to Kansas City, via Indianapolis (new car, moderate traffic)	- - - -	19.9 m.p.g.
Kansas City to Albuquerque, N. Mex. (heavy crosswinds, high speeds)	- - - -	15.8 m.p.g.
Albuquerque to Los Angeles (car broken in, moderate speeds)	- - - -	23.1 m.p.g.
(Regular gasoline of various brands used all the way)		

Comments of V8 Owners

Owners of the V8 hardtop models are a well-satisfied group. There were 40 percent of them without a single complaint! Of the family-sedan owners, 33 percent failed to list any complaints. Fifteen percent of the V8 owners did complain of the interior room and seating comfort in the hardtop models.

"Don't like the compartment in center of rear seat and the foot holes in rear floorboards."—Lewiston, Idaho, policeman.

"Rear seat not too useful for adults. Excellent for children. Comfortable riding but cramped."—Park Forest, Ill., engineer.

Top complaint among the V8 family-sedan owners was body assembly and poor door fitting. There were 29 percent who listed this complaint when filling out their questionnaires.

Here are some additional comments from owners of Commanders and Land Cruisers:

"Steering on the Commander (hardtop) is a little hard."—Wichita, Kans., newspaperman.

"Coupe's only real fault is a certain stiffness of ride although it rides over very rough roads excellently."—Washington, D. C., attorney and hardtop owner.

"Knees hit the steering wheel getting in and out (of hardtop)."—Richmond, Va., salesman.

"Would like more bumper protection."—Detroit, Mich., owner of a family sedan.

"It seems there is too much weight on front wheels. When we had snow here I could hardly start up from a dead stop."—Milwaukee, Wis., family-sedan owner.

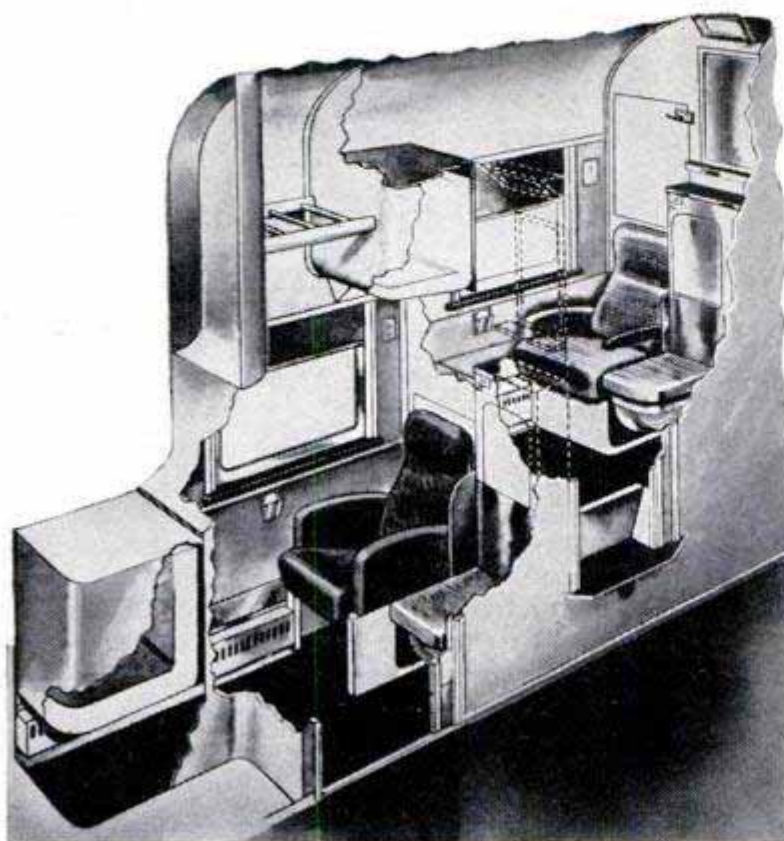
"The sole reason I bought a 1953 Studebaker was my firm belief that any other car with present styling will be obsolete by 1954."—Oak Park, Ill., sales executive and Commander hardtop owner.

"Only automatic transmission that does not creep or roll back on a hill. These features alone sold me on a Commander."—Indianapolis, Ind., salesman.

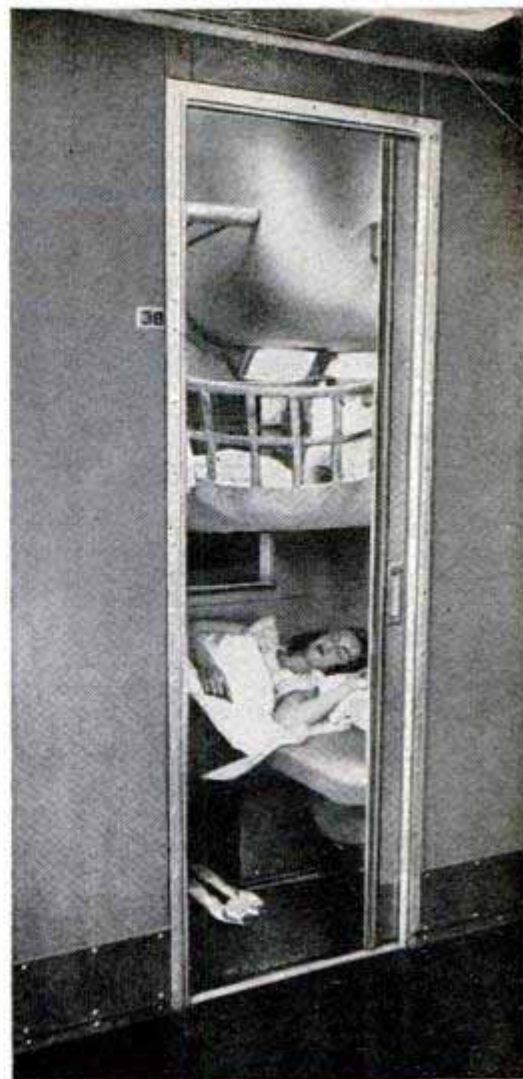
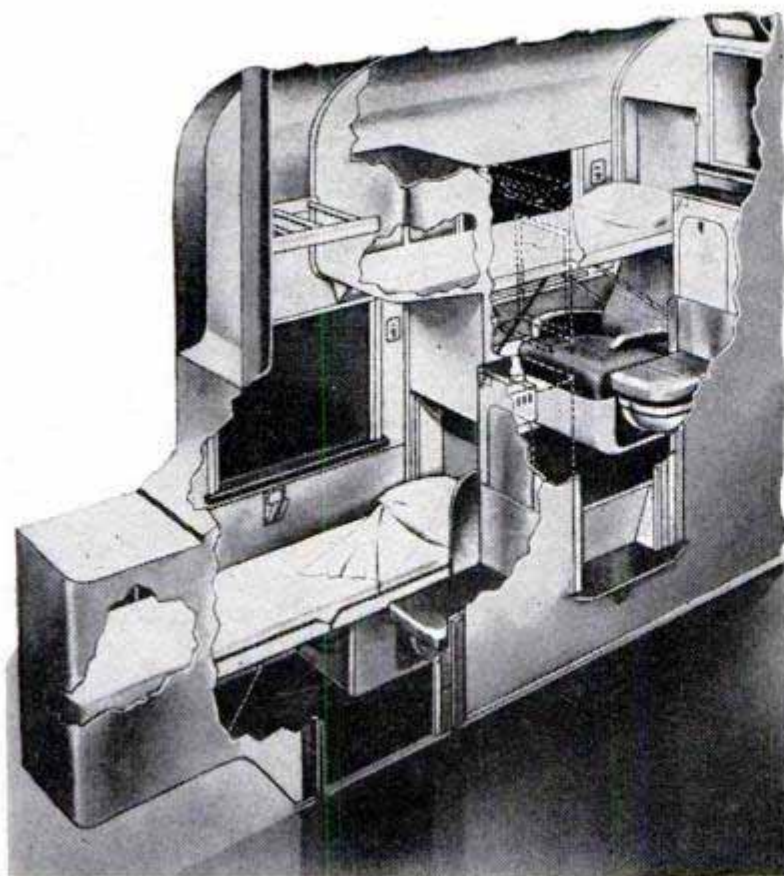
"The window handles turn the wrong way."—Boise, Idaho, contractor and sedan owner.

"Absence of a dome light in the rear of the Commander (hardtop) makes it difficult to get in and out
(Continued to page 228)

Railroad Car Will Sleep 40



During the day, left, foot section of bunk is stored in "boot" at the head of compartment, the rest in a compartment behind seat. Right, baby crib can be suspended above the bed in lower room, below it in upper room. Below, rooms with beds in place



EVERYONE HAS a private sleeping room in a railroad car proposed by Budd Mfg. Co., which would sleep nearly as many passengers as a day coach carries. Fares would compare with ordinary coach rates.

There are 36 singles and two double rooms, distributed on both sides of a two-foot aisle. Space is divided into upper and lower rooms. The lower rooms are at floor level; upper rooms are reached by two 12-inch steps. Each room has a single daytime seat, a two-part cot-size bed, folding wash basin, a toilet and space for luggage and hanging clothes.

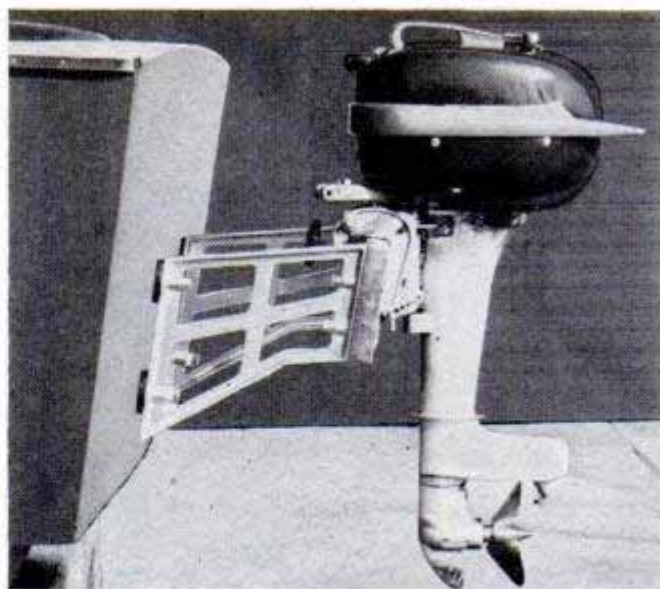
In the upper rooms, one section of the bed swings down from an alcove above and behind the seat while the foot section folds out of a "boot" in the forward wall of the room. In the lower rooms, one section folds out of an alcove behind the seat and the other section folds out of a forward-wall boot. With bed folded down, there is room for dressing purposes. Each room has separate air-conditioning and heating controls.

Battery Adjusts Capacity For Winter or Summer Use



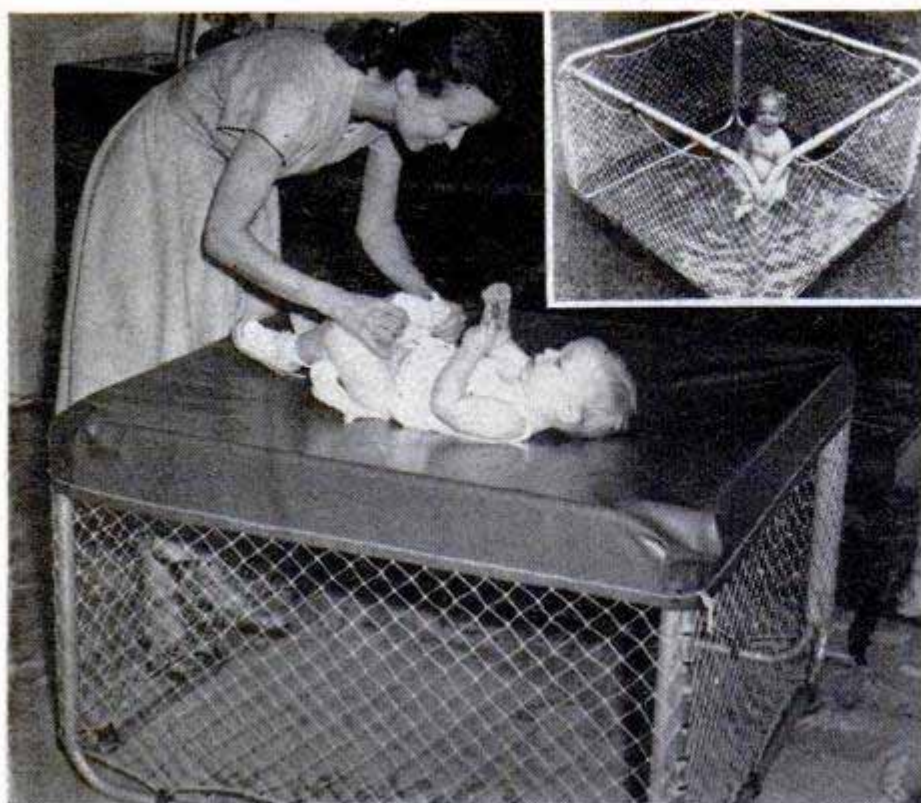
Motorists can "change" batteries for winter just as they change oil, but they don't have to move the battery to do it. They merely turn a key in each cell. Turning the key opens or closes a vent hole inside the filler wells and regulates the water capacity, increasing it for summer and decreasing it for winter. Greater water capacity makes for longer life through decreased acid deterioration. Smaller water volume assures prompt starts in winter.

Cushioned Outboard-Motor Mount Reduces Noise and Vibration



Vibration and noise are absorbed by an outboard-motor mount that holds the motor a foot away from the rear of the boat. Made of sturdy aluminum alloy, the bracket fastens to the transom with four bolts encased in rubber tubes and set up on rubber gaskets. The motor clamps to a thick piece of marine plywood on the end of the bracket. Oil and gas can't leak into the rear of the boat and damage to the boat transom from mounting is eliminated. There is no need to cut down the transoms of outboard cruisers and large runabouts to accommodate standard-shaft-length motors, and steering is reportedly improved. Various-size mounts are manufactured.

Combination Dressing Table-Playpen Serves Also as Wading Pool



Designed to keep children from roaming, a versatile playpen also serves as a wading pool and dressing table. It is turned upside down to form a dressing table or a shaded play area for the baby. A vinyl-plastic bottom extends up a few inches along the sides to hold water, providing a harmless pool for the youngster. Folded and stored, it forms a compact bundle easy to take on trips.

ⓈHome accidents caused approximately 29,500 deaths in the United States in 1952—500 more than occurred in 1951 according to the National Safety Council.



Above, thatching the roof with palm fronds. Right, completed "bohio" frame



Home, Sweet Bohio!

By Ralph K. Skinner

TROUBLED by the high cost of building? You might take a tip from the natives of Central America, who have solved their housing problem over the centuries with a neat little shelter known as the "bohio." The only construction tool needed is the long-bladed machete. Sturdy branches of trees are hacked to a common length and inserted in the ground a few inches; they comprise the main support pillars. Connecting these are straight lengths lashed to the tops of the supports. More poles are

slanted up to form the framework of the roof. Instead of nails, the various pieces are tied or lashed together with bejuco vine. Next comes the roof. Slender saplings are threaded through the main roof members to form a latticework, and palm thatch is bound into the framework. Side walls are of inch-thick boughs, stuck into the ground and tied to the "rafters."

Below, farmer lashes his house together with bejuco. Bohio at right has tiny bedroom reached by ladder



JACK OF ALL

By
Arthur R. Railton



Station wagons appeal to many types from the couple in a trailer to the country-estate owner. This Plymouth Savoy is the de luxe descendant of the car that started the trend—the Suburban



Couples with small children have discovered a solution to the problem of long auto trips. A station wagon provides a large play area where youngsters can spread out their toys and books

Homeowners put station wagons (and themselves) to work on week ends, using the car as a truck. They haul sand, gravel, loam or anything. When the job is done they just hose out interior



TRADES—THE STATION WAGON

STATION WAGONS and shiny black puttees once went together. If you could afford a chauffeur with leather puttees, you very likely had, parked next to the limousine in the carriage house, a squarish, well-varnished station wagon. It was sort of a well-bred truck. The housekeeper and chauffeur used it for the daily shopping trip. It hauled your guests' baggage from the station. It picked up the laundry and did a hundred other jobs.

Today, the shiny black puttees have just about vanished. The chauffeur is getting mighty scarce. But the station wagon is more popular than ever, although with a different type of owner.

The entire station-wagon picture took an abrupt change just after World War II when Willys brought out its all-metal design—a station wagon without the bothersome and hard-to-keep-up wood side panels that have to be varnished annually.

Chevrolet had built an all-steel station wagon back in 1936, but it had been aimed at the livery market—for hauling guests from the station to the resort hotel or for short sightseeing tours. It was sort of a miniature bus rather than a family car. It seated seven with reasonable comfort in its three parallel seats. But it never attracted the average-car buyer.

The Willys design also fell a little short of what the public wanted. It did provide Willys with a means of entering the passenger-car field with its world-famous Jeep chassis. It was accepted widely as a combination commercial-pleasure vehicle, but it lacked the styling and comfort that America demands in its family cars.

Then in 1949 the big stimulus came when Plymouth brought out its Suburban, a

name that has become almost generic for the field. This car was the personal baby of K. T. Keller, now chairman of the board of Chrysler Corporation. He rode in a vehicle with a Suburban-type body during a visit to Africa and fell in love with it. The car was a Plymouth that a plantation owner had rebuilt with a body to enable him to sleep in it if necessary on his hunting safaris. Keller came back to this country convinced that such a car would sell in the passenger-car field.

Previously, the station wagon had been more of a truck than a passenger car. It was built on a light truck chassis and designed more for carrying loads than for making its riders comfortable.

But the Suburban was built with emphasis on comfort. Load-carrying ability was important, but it was secondary to style and riding qualities. Within a couple of years, Plymouth was leading the entire station-wagon field by a terrific margin. It didn't take long for other manufacturers to recognize a good thing and today there are many that build these all-metal utility vehicles. So different are these cars from the old station wagons that industry is slowly dropping the original name. Now they call them utility vehicles, and that is exactly what they are. The third seat, far in the rear, that was once characteristic of station wagons is gone. Passengers sit on conventional sedan seats that are wide and comfortable. Six persons can ride in comfort and there is still room in the rear for luggage.

Today's station wagon or utility vehicle provides excellent vision in all directions. There are no rear fenders to worry about when backing it into a parking space or

With a mattress and sleeping bag in the back end, a station wagon gives sportsmen a weathertight "tent"

Wives discover that the versatile vehicle is equally capable of hauling shrubs, groceries or baby buggies



PONTIAC has two models. One is an eight passenger; the other a six passenger with rear seat that folds flat into the floor



↖
MERCURY'S station wagon is a four-door design. It has wood side panels mounted over the steel body as a luxury touch



↖
CHRYSLER'S four-door station wagon, and the others as well, is a practical and handsome car for newsreel and TV cameramen



BUICK calls its version an Estate Wagon and makes it available only in its V8 models. The trim around the windows and rear door is real wood, mounted on the steel body as decoration

DODGE'S two-door station wagon is sold with either the six or V8 engine. With rear seat down, cargo space is 69 inches long



↖
DE SOTO produces its station wagon in both the six and V8 lines. Like most of the big-car wagons, it is a four-door model. All-steel, it doesn't use the hard-to-keep-up wood panels

garage. Driver and passengers are completely surrounded by glass and see everything. It is like riding in an observation car. Most drivers find them easier to park than sedans.

Some companies make their station wagons with two doors, some with four doors. Very few retain the third seat in the rear. The seat behind the driver is designed so that in a few seconds it can be folded out of the way. The seat cushion swings forward against the back of the front seat and the back cushion of the rear seat drops into a well in the floor, leveling the floor for its full length. This provides a smooth, easy-to-clean deck almost six feet long.

The spare tire is carried in a well in the rear deck just above the gasoline tank. A tight-fitting cover keeps out dirt and water. This arrangement has one drawback. Should you have a flat tire while the back end is fully loaded (and the most likely time to have a tire go down is when the car is heavily overloaded), you have to unpack the rear end to get at the spare. The single exception to this spare-tire arrangement is Willys, which mounts its spare vertically inside the passenger compartment. It is much easier to get at, but interferes with loading and does not add to the appearance of the car.

Today's major market is divided among the low-price cars—Ford, Plymouth, Nash Rambler, Willys and Chevrolet. Ford is the big seller now with its Ranch Wagon, a two-door model, and the Country Sedan and Country Squire, four-door models that are de luxe versions. The latter has an exterior paneling of wood attached to the steel sides to create the air of luxury. Production figures for the various makes are secret, but estimates put Ford's share of the market at about 28 percent.

Plymouth is next with two lines: The famous pioneer, the Suburban, and its dressed-up model, the Savoy, known at Plymouth as the country-club version of the popular Suburban.

About 90 percent of the total station-wagon sales are in these lower-price lines. However, the more expensive makes are not out of the picture entirely. They have discovered that there is money to be made in station wagons, which are just about the highest-priced models in any line. A few convertibles run higher, but not by very much. However, unlike the convertible, the station wagon has added utility to compensate for the added cost.

What has caused the increased appeal of the station wagon or

utility vehicle? There are many reasons—so many that it is called the car with 101 uses. Initially, the utility car was bought by the small businessman or contractor. He could use it for business all week, wash it out with a hose on Saturday and have a handsome, comfortable family car that his family was not ashamed to ride in. It is ideal for that. But there is a newer appeal to the car—an appeal that has not been fully developed by the companies. It has, like Topsy, just grown.

With the migration of families to the suburbs and the boom in home building, the man of the house suddenly discovered he needed more than a plush sedan. Roomy as it was, it wouldn't do everything he thought it should. He found he needed black dirt for his garden, sand and gravel for that concrete job he planned, lumber for the garage he was building. And he usually wanted these items on a week end when deliveries were slow if available at all. So he began using the family car for the job and discovered it just wasn't designed for that.

Then he found the utility vehicle. And when Mr. Homeowner began buying it, the sales soared. In 1947, for example, only 79,438 station wagons of all types were sold. In 1952, the total was 189,651—most of which were of the utility type rather than the plush station-wagon type.

Wives like the utility car also. They don't have to worry about children's muddy feet on the upholstery—it washes clean with soap and water. If they want to take the baby buggy and playpen along, it is an easy operation to lower the tailgate and load them in the back end. On long trips, the rear end, with the rear seat folded into the floor, is an ideal play area for the youngsters while mother and dad travel in

CHEVROLET'S Handyman has four doors. Rear seat folds forward to increase cargo space, a standard arrangement in the industry





FORD makes both two and four-door models. Its two-door Ranch Wagon, above, is the top seller in the field

comparative quiet up front. If you throw a mattress on the floor, the children can sleep without danger of falling off a seat. Toys and books can be brought along for the youngsters' entertainment.

Dad likes it too, for more than just work. If he's a sportsman, he finds that he and a friend can sleep in the back on week-end fishing and hunting trips. It makes his week ends much longer. He can start out on Friday night, drive 200 miles to a good stream where fish are biting, crawl into a sleeping bag in the back end away from insects, dampness and weather. Early Satur-

day morning he is ready to throw out the line. Then he can drive back home Saturday night, clean out the rear end and take the family to church in a car that is not only comfortable, but has a styling that makes the neighbors envious.

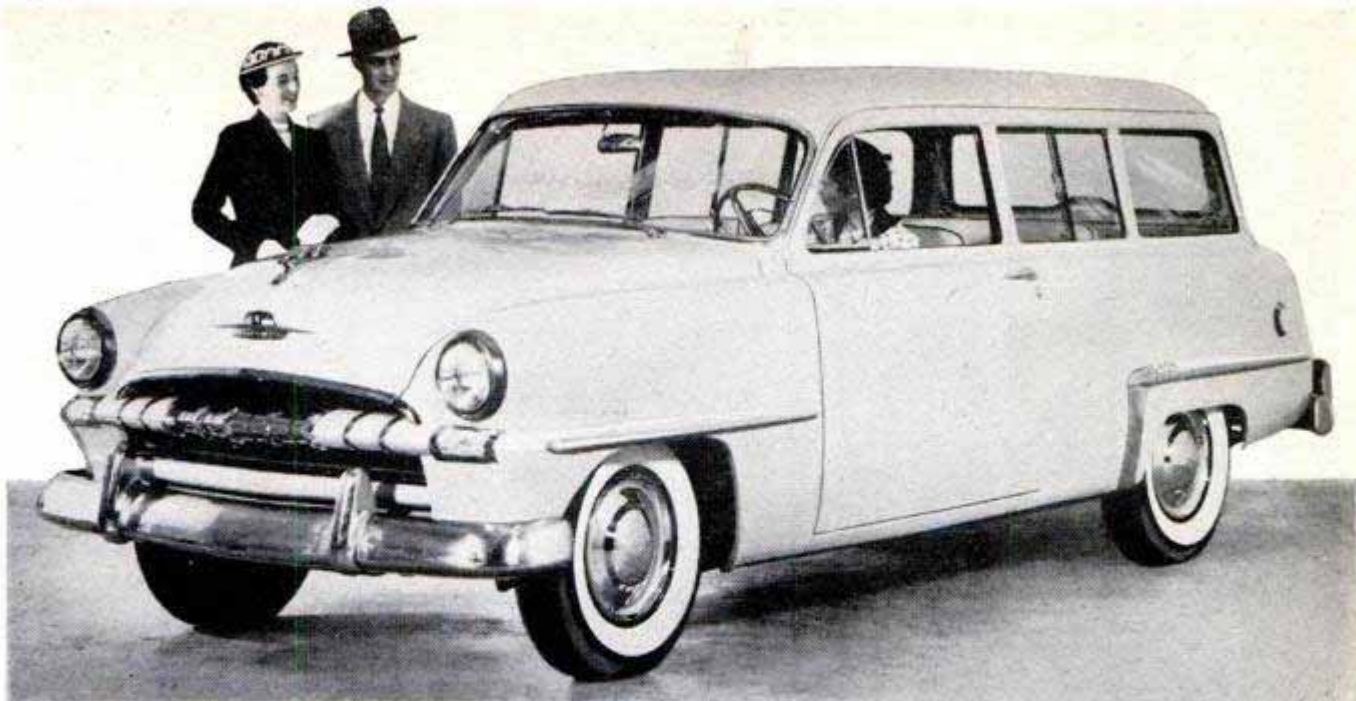
Of course, everything is not perfect—the utility vehicle has its drawbacks. Biggest drawback is the price. It costs more than ordinary sedans, not so much because of the extra work involved but because of the low production runs. The dies have to be paid for, and the fewer units produced, the higher the cost per unit. While station wagons are getting more numerous, they don't come close to the number of sedans being sold.

Then there is depreciation. Certain models depreciate more quickly than others. Some of the new flashy designs are holding up fairly well, but generally speaking, the buyer will lose more than he would on a four-door sedan.

Designwise, there is a noise problem. The rear end and wheels are "inside" the passenger compartment, not under the trunk as in the standard sedan. That means added interior noise, but most owners feel the noise is

KAISER provides station-wagon cargo space in a conventional sedan body by hinging the rear deck so it opens wide. Spare tire is under the floor





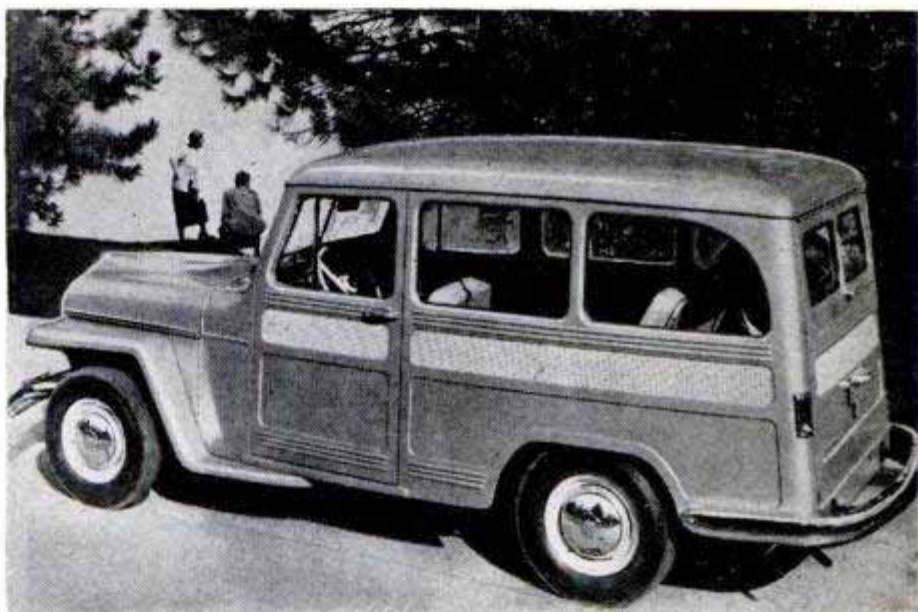
PLYMOUTH, first to break into the mass market with a station wagon, now builds two—the Suburban and Savoy

small compared with the advantages.

All manufacturers have given up the wooden bodies once associated with station wagons. Several still add wooden panels to the steel bodies for decorative purposes, but even these are becoming fewer each year. There are good reasons for the switch. Metal bodies are easier and cheaper to build. They are more durable and cheaper to maintain.

During this switchover period, cautious designers are providing wood-grained metal bodies in some lines. These look like wood but don't have the upkeep problems. More and more, however, the companies are going to all-steel bodies with no attempt at making them look like wood.

Station wagons got their name because they once carried people and baggage to the railroad station. The new term, utility vehicle, is more accurate, but lacks appeal. What is needed is another name. Maybe family wagon would be better. That's what it is—a wagon that the whole family can use and enjoy. ★ ★ ★



WILLYS has had an all-steel station wagon since 1946, emphasizing utility rather than style. **NASH**, below, makes a station wagon in its Rambler line



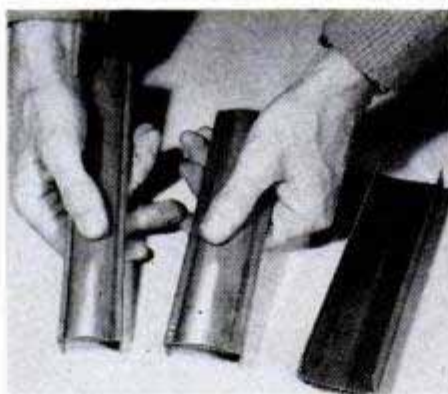
Tobacco Growers Protect Burley Crop With Propane Heaters



Burley tobacco growers, who harvest their crop in August and September and hang it in barns to cure by air, are now using liquid-propane gas burners to halt rot and "house burning" of the product. Gas is stored outside the barn in 500 to 1000-pound tanks and travels into the building through a high-pressure line. The fuel is stepped down by a regulator and passes to the heating units through low-pressure copper lines. The small heaters give off radiant heat and diffuse heated air from six radial vented pipes each 10 feet long.

Metallic Weatherstrip Applied Like Adhesive Tape to Doors

No tacks, nails or screws are needed to install a metallic weather stripping that has a powerful adhesive backing. The stripping consists of an arched strip of spring bronze fitted against a flat bronze strip that has an adhesive backing like that of pressure-sensitive tape. The weather stripping is installed with the adhesive back in contact with door or window frame. The flexible arched portion adjusts itself to the contour of the door edge, creating a seal against air, dirt and water. A U-shaped



channel with an arched bronze strip but no adhesive backing is fitted to the bottom edge of the door and is held there by friction.

Posthole Digger Mounted on "Buggy" Operated by One Man



One man can operate a new gasoline-powered posthole digger that is mounted on a "buggy" for easy movement from place to place. The earth auger is operated by a one-cylinder air-cooled engine working through a transmis-

sion that reduces the speed to 100 revolutions per minute. The drive shaft is supported by an undercarriage with two bicycle-type wheels. The digger will drill a 42-inch hole in less than a minute. Earth augers from six to sixteen inches in diameter can be used with the machine. It has equal power in forward and reverse.

Canvas Reservoir Aids Fire Fighters

Water can be brought to rural, forest and brush fires in a canvas water tank that is simply thrown on the back of a truck. Two models of the 300-gallon tank are manufactured: One is completely waterproof, the other will leak up to 20 percent of its contents until the fabric becomes saturated and swells to prevent further leakage. The water-saturated type is used close to the fire because it can't burn.



Pedal on Spade Cuts Labor

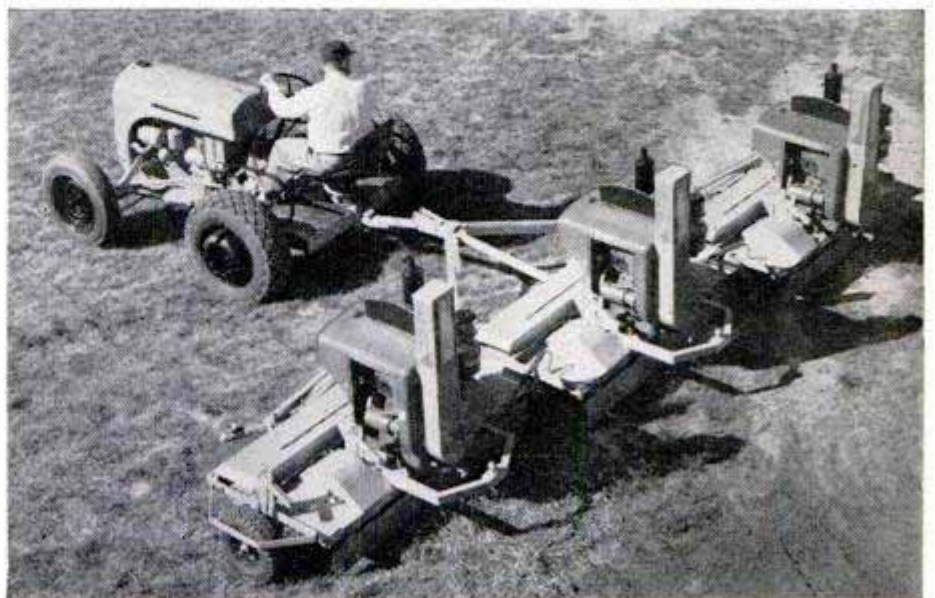
You can spade up the garden in no time with a German shovel that eliminates wasted effort. A pedal which projects from the rear prevents the spade from losing part of its bite when a cut is made. The leverage obtained will send a bite of dirt flying, even without great effort from the user. Imported from Germany, the spade has handlebars instead of a hand grip, and contains fine German tool steel.

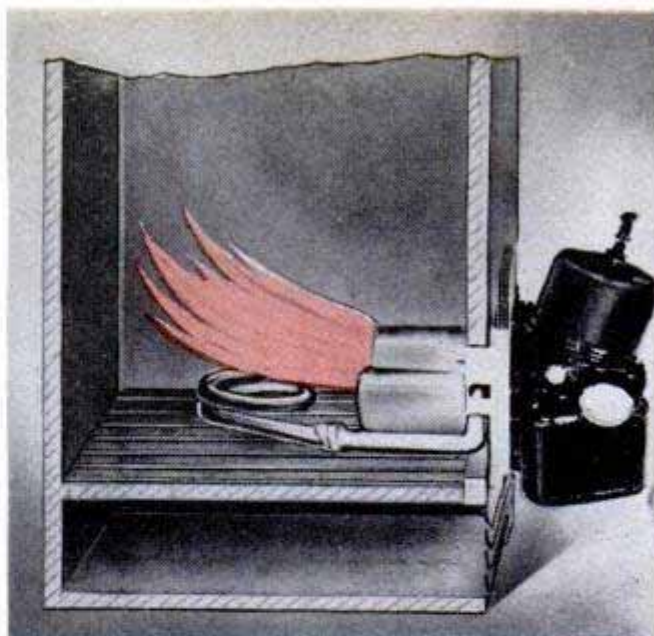
Latex Paint Seals Cellar Walls

One coat of a new latex-base paint is enough to make even cinder block waterproof, the manufacturer claims. Applied to basement walls, it seals cracks and pores in concrete, brick and plaster and forms an attractive finish which will not peel under constantly moist conditions. Brushed, rolled or sprayed, it dries in 30 minutes.

Three-Gang Mower

Cutting a swath 17 feet wide, a new three-gang mover can cover 18 acres a day. The three mowers are connected side by side and pulled by a small tractor, truck or Jeep. The units are identical. Each has a 13.3-horsepower air-cooled engine which operates the rotating disks and cutter blades. The mowers will cut, shred and mulch grass, weeds, cover crops, as well as corn stalks and stubble.





Small superheater for vehicle engines and "blowtorch" heater for field kitchens both have pulse-jet motors

Pulse Jets Similar to Buzz Bombs Serve as Superheaters

COMPACT ENGINES, similar to the pulse jets that sent buzz bombs screaming over England in World War II, have recently turned their hot exhausts to peacetime pursuits. One unit, no larger than a gallon jug, is a cold-weather preheater that hooks onto the engine block of any vehicle. In the 70-degree-below-zero temperature of the Arctic, a driver need only flick a switch to bring the engine up to summer operating temperature. The same unit, with a heat exchanger, becomes a heater capable of warming the entire interior of a semitrailer. A similar pulse-jet motor, rigged like a

blowtorch, provides roaring flames in field-kitchen ovens in France. Hooked to a radiation panel, it becomes a space heater capable of supplying 120,000 B.T.U.s per hour—enough to heat a big barn on a windy winter day. Still another pulse jet produces big clouds of insecticide fog. The heater generates an exhaust that streams through a tube. Valves in the tube open to admit the fumigant, and when the poison-charged exhaust hits the cool air it condenses into tiny droplets. Because the fog gun is small and weighs only 30 pounds, the operator can climb trees and ladders with ease.

Cloud of insecticide billows out of new fog gun. Exhaust from pulse jet picks up fumigant to form the fog



Londoner Puts His Arms to Work Pumping His Bicycle

Arms and legs are exercised by an unusual bicycle built by a man in London, England. Two long levers extend vertically above the cross-bar and are linked to an auxiliary sprocket wheel. As the levers are pumped back and forth by the rider's arms they turn the sprocket which is connected by chain to the main sprocket wheel operated by the legs. The purpose is twofold: (1) the arms are exercised and (2) you get increased speed and hill-climbing ability. Experts can pump with hands and steer by balance.



Flint-Asphalt Roads

Pavement made from flint and asphalt is proving its worth in Denmark. The light-colored paving is said to retard skidding and last longer than conventional material. It has an asphalt base and consists of 40 to 60 percent flint, burned white at temperatures of about 1800 degrees Fahrenheit. Under test for 14 years, the flint-asphalt combination has withstood traffic wear so well that it now paves 300 miles of roads linking Danish cities.

Black-Light Traps

Black or ultraviolet light is the bait which lures thousands of insects into traps maintained by a group of Texas entomologists. Unaffected by ordinary lights, moths of the cotton-destroying pink bollworm are attracted by radiation in wavelengths just shorter than the visible spectrum. Though not used as a control measure, the traps keep track of new infestations and capture the moth in large enough numbers for effective study by the scientists.

Wallpaper Paste Goes on Wall to Speed Chore of Paperhanging

By spreading the paste on the wall rather than on the paper, the homeowner can decorate a room faster and with considerably

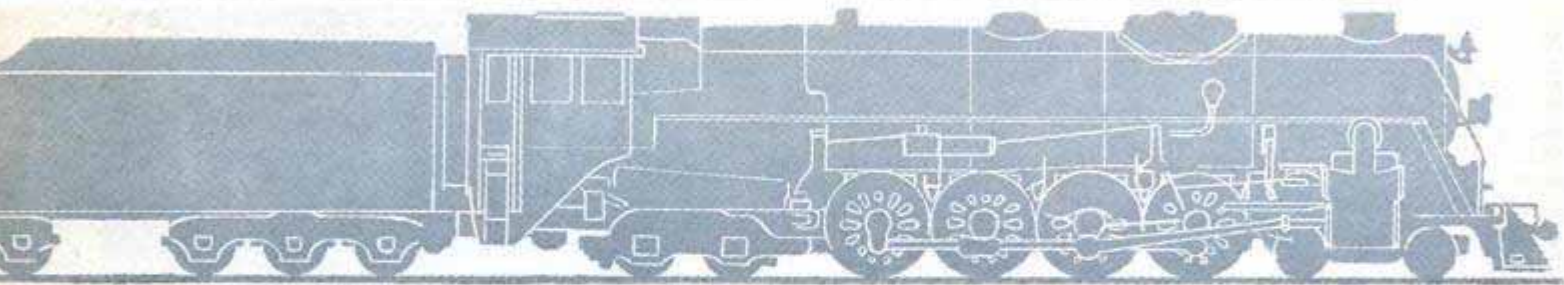
less mess. Making this technique possible is a new wallpaper adhesive that is spread with a paint roller. Any type of wallpaper

can be used and the adhesive will make it stick to just about any surface. With the adhesive on the wall you merely start the roll of paper at the top and unroll it down to the bottom of the wall. Then cut off with a razor blade and smooth the strip before hanging the next. The paper stays in dry, rolled form, making it easy to handle. Another advantage of the adhesive is that old paper can be removed simply by soaking it with water. The paper pulls off in full strips after soaking.



The iron horse is dying. The diesel-electric is here today, may be gone tomorrow. Will the railroads turn finally to the gas turbine, the electric locomotive or to atomic power? *Popular Mechanics* brought together four men who live with locomotives to answer the question:

WHAT COMES AFTER THE IRON HORSE?



QUESTION: What are the efficiencies and advantages of various types of locomotives? What, for example, is the efficiency of the steam locomotive?

HOPPE: I should say a good average efficiency for a modern steam locomotive would be somewhere between 7 and 7½ percent.

Q: You have lost 93 percent of the original energy?

HOPPE: Yes, and about 90 of that goes to make the noise and throw the cinders all over the vicinity. Diesel engines have had the highest efficiency. They will run up very close to 40 percent.

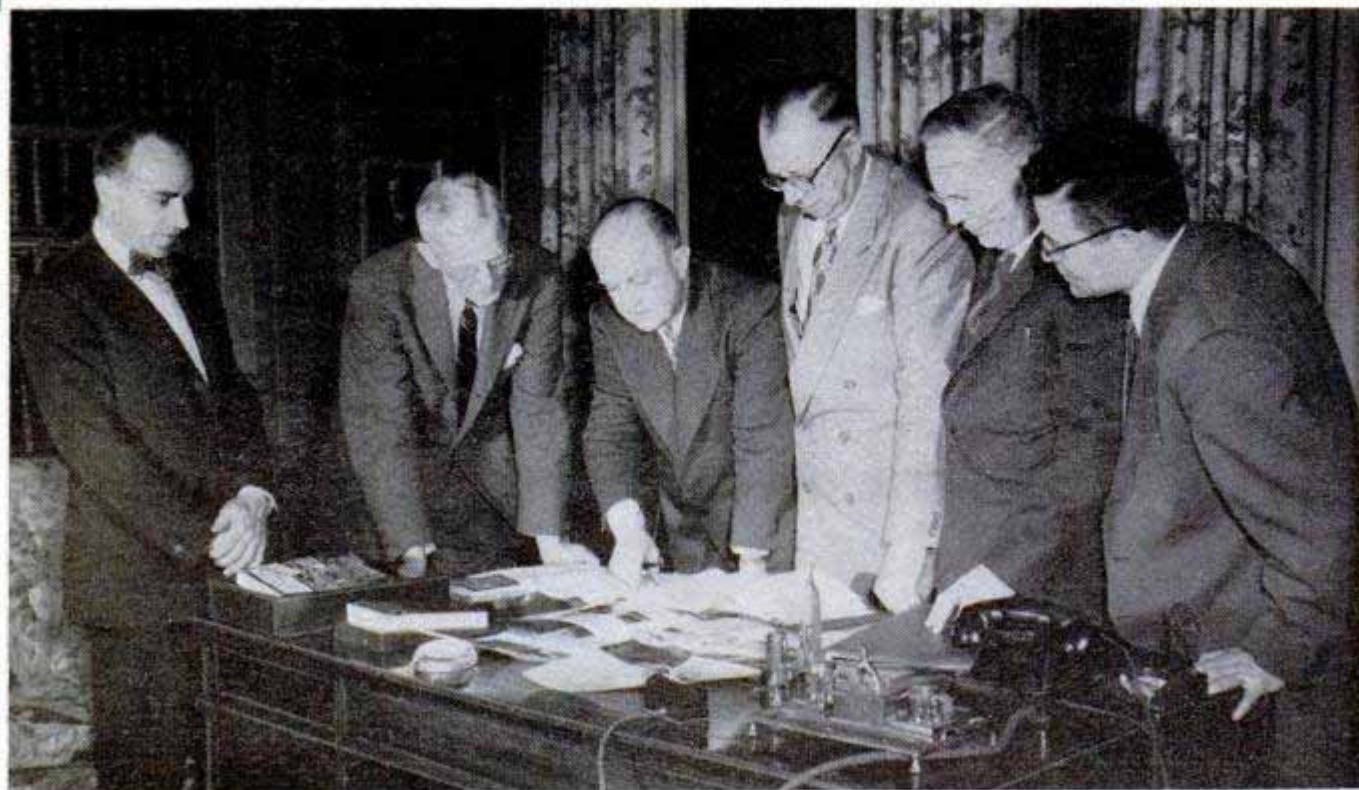
Q: Just what is a diesel locomotive? What does it do?

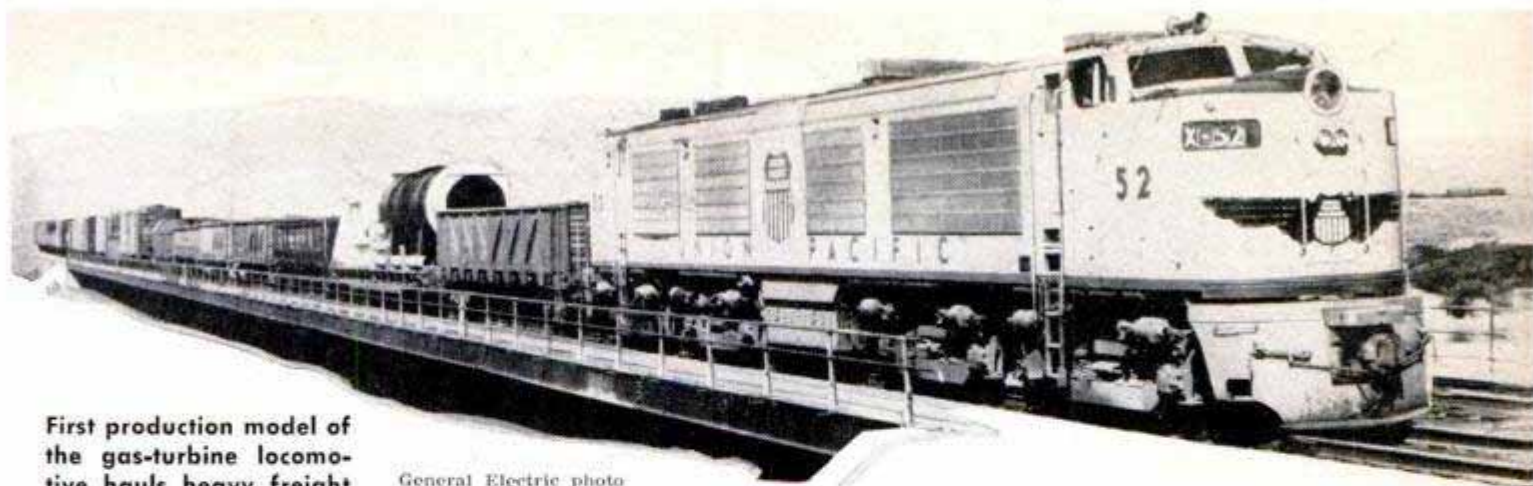
HOPPE: It takes the fuel oil, burns it directly in the cylinders of a diesel engine, part of this power going to the generator which, in turn, feeds it to the traction motors in the form of electricity. The main purpose is to take the energy that is in the fuel as heat and convert it into electrical energy, which is used for the traction motors.

Q: What is the principle behind a gas turbine? How does it differ from a diesel?

JOHNSON: There are several ways to define a gas turbine. I think the simplest way is to say that it is a machine that uses

The panel, left to right: Richard F. Dempewolff, New York, Eastern Editor; Charles Kerr, Jr., East Pittsburgh, Pa., Consulting Transportation Engineer, Westinghouse Electric Corp.; A. G. Hoppe, Milwaukee, Wis., Mechanical Engineer, The Milwaukee Road; B. V. Johnson, Omaha, Neb., Superintendent Diesel Maintenance, Union Pacific; Robert Williamson, Schenectady, N. Y., Manager, Railroad Rolling Stock Sales, General Electric Co.; Clifford B. Hicks, Associate Editor





First production model of the gas-turbine locomotive hauls heavy freight

General Electric photo

burning fuel to develop expanding gases which, in turn, operate a rotor and shaft. The rotor is a wheel which has shaped buckets attached to the outer edge. It differs from a diesel engine only in that it uses expanding gases against the rotor to get a rotary motion, whereas a diesel engine uses gases to force a series of pistons down to get the same motion. A gas turbine has only a rotary motion, whereas a diesel has both rotary and reciprocal motion.

Q: What about gas turbines? Are we going to see railroads switching from diesels to turbines within the next 10 years?

KERR: As we see it at Westinghouse, the gas turbine fundamentally has three big advantages. The problem is whether we can take advantage of them. One of them is more horsepower in a limited space than you can secure with any other prime mover. The second one is the possibility of burning the cheaper oils. The third thing is that the gas turbine is a rotating machine and not a reciprocating machine and, fundamentally, a rotating machine will be less expensive to maintain.

Q: Why do you take a perfectly good diesel engine or gas turbine and convert its output to electricity? Why can't you run it directly off the diesel or turbine?

HOPPE: It's the most convenient way of converting the rotative energy of the diesel engine. There are other means of converting that energy to the wheels, as is illustrated by the Budd self-propelled rail cars. They use a torque converter similar to the drive on the Buick automobile.

KERR: A diesel engine has such poor characteristics for pulling trains you have to use a torque converter between the engine and the driving wheels.

WILLIAMSON: A diesel engine produces its rated horsepower at one speed—the top speed. A locomotive has to be able to handle a train at anywhere from zero speed to the maximum speed. Therefore, in order to make the most efficient use of the horsepower that the diesel engine, or gas turbine for that matter, can deliver at only one certain engine speed, you have to have some sort of connection between that block of horsepower and your wheels which

Nicknamed the "Blue Goose," this 4000-horsepower gas turbine has proved itself in experimental service

Westinghouse photo



can convert that horsepower into a very high starting ability at low speed, or a low tractive effort at high speed. Any drive, to operate successfully in our heavy American railroad service, has to have what we call a 10-to-1 wrap-around. You have to be able to deliver full horsepower from 6 to 60 miles per hour or from 10 to 100 miles per hour or whatever numbers you want to pick out.

Q: *The conversion to electricity for driving power serves the same purpose as a transmission in an automobile?*

WILLIAMSON: Exactly, except as Charlie pointed out, it's very much more accurate.

Q: *More flexible?*

WILLIAMSON: And has a wider range of operation.

KERR: With about a 3-to-1 torque range you can run an automobile very nicely. On a locomotive you need a 10-to-1 torque range and no one has ever made a mechanical drive that can do that satisfactorily.

JOHNSON: You may be able to produce a torque converter for one pair of wheels or possibly two, but where you have to spread them over 70 or 80 feet and four or more pairs of wheels, it presents a problem that hasn't been solved yet to my knowledge.

Q: *Before we write off the steam locomotive, isn't the Norfolk and Western still building some?*

HOPPE: They are building their own steam locomotives and they have an "ax to grind" since they are essentially a coal-hauling road. They have very good coal right at their back door and they have made more of the steam locomotive than any other railroad I know of. They are the best steam operators in the world.

WILLIAMSON: A handy way to compare locomotive efficiencies is to remember that the steam engine is right around seven percent efficient in road service. The gas turbine is about twice as good as the steam locomotive and the diesel engine about twice as good as the gas turbine.

Q: *If we find that the railroads are switching to turbines, then, they are going down in efficiency?*

KERR: I think one thing is that while the diesel is probably pretty close to its maximum efficiency, the gas turbines are in their infancy.

Q: *What about the steam locomotive; has it reached maximum efficiency?*

HOPPE: There appears to be no possibility

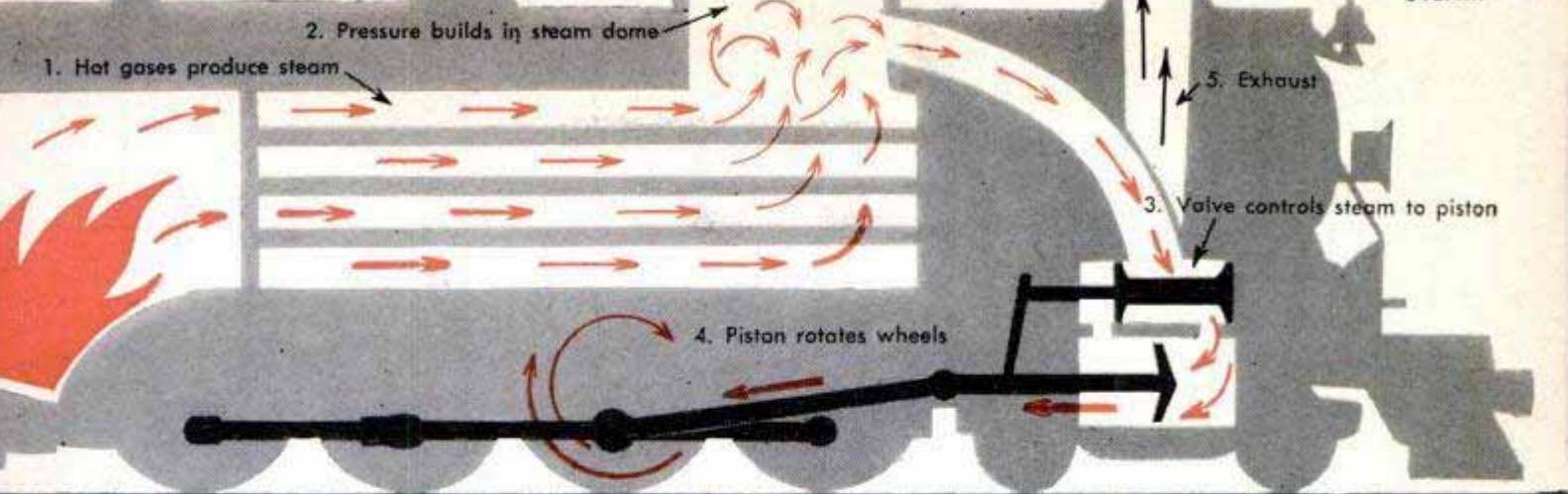


2. Explosion moves piston, turning shaft

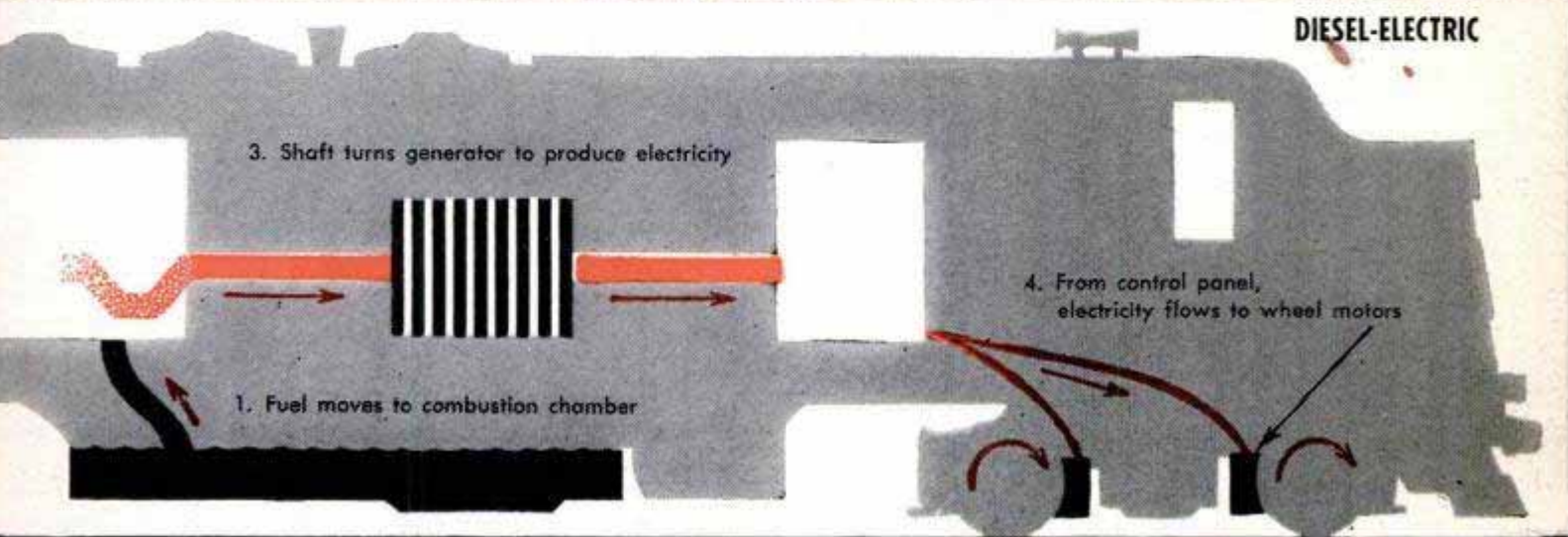


3. Gas turns turbine blades which rotate shaft

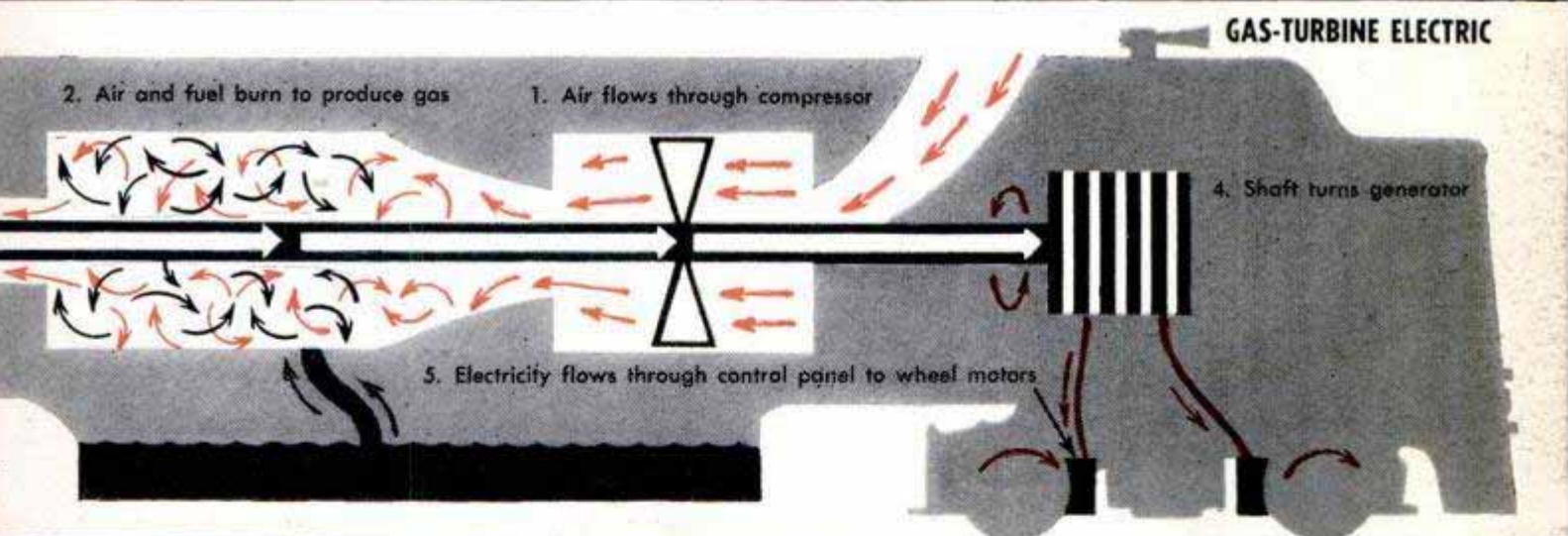




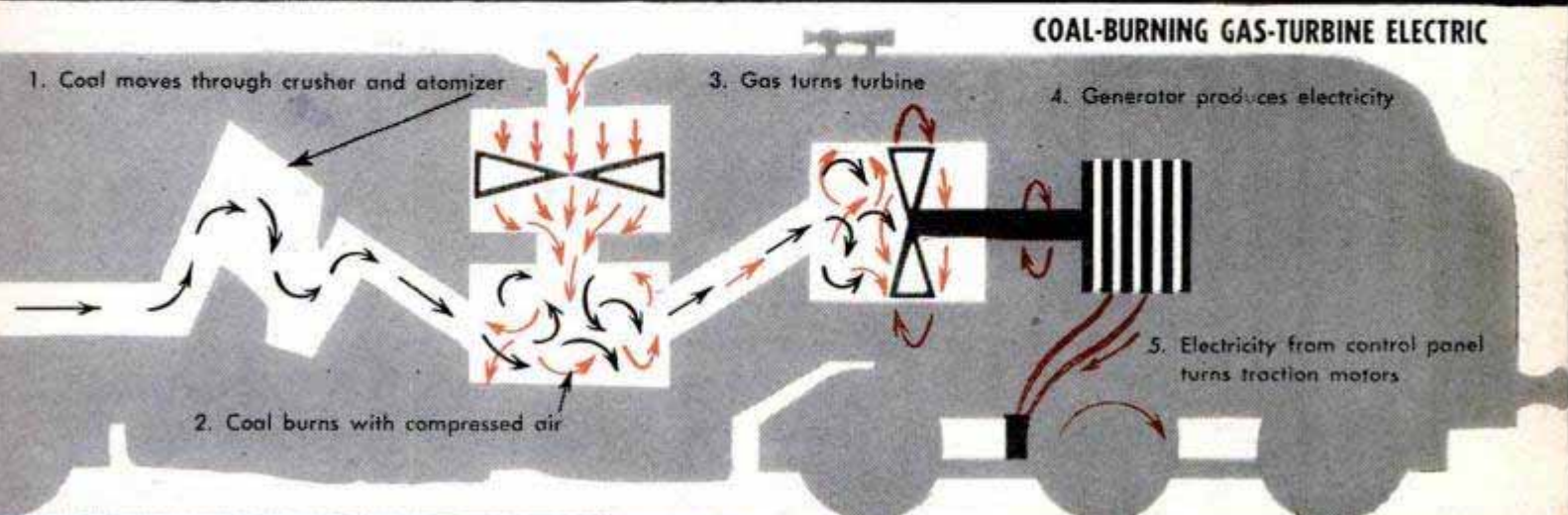
DIESEL-ELECTRIC

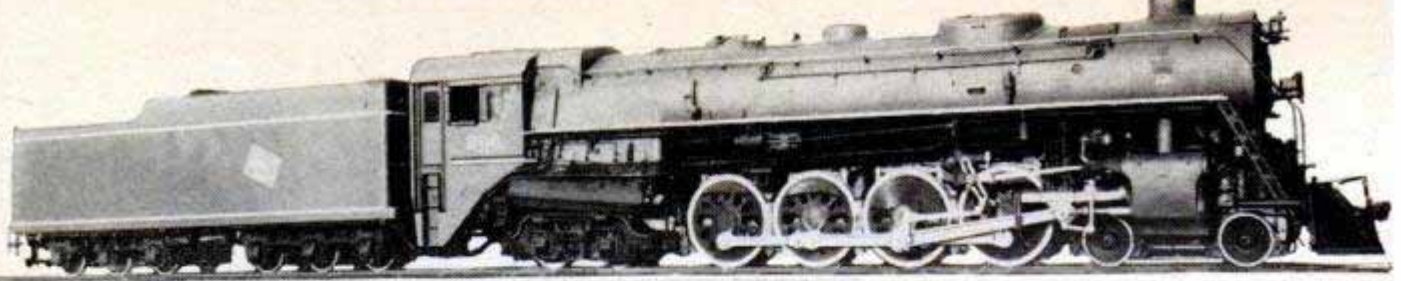


GAS-TURBINE ELECTRIC



COAL-BURNING GAS-TURBINE ELECTRIC





Last of the modern steam locomotives purchased by the Milwaukee Road went into service nine years ago

of any fundamental improvement in the efficiency of the steam engine.

KERR: On the turbine-electric we expect to get 11 percent.

Q: We seem to have standardized into a 1600 horsepower diesel-electric locomotive unit. What about the Fairbanks-Morse Trainmaster? Isn't that a different package unit, something new?

WILLIAMSON: Yes. It has just 50 percent more power and weight and it does exactly the same kind of railroading. To make a 4800-horsepower locomotive you use two pieces instead of three.

KERR: I think this much: If you study the history of the steam locomotive, you will find that the largest units used have doubled in horsepower about every 25 years. It's gone up in railroading, it's gone up in the automobile, in the airplane and the only way to get speed is to use more horsepower. To me, horsepower will continue to go up and never will stop.

WILLIAMSON: If anyone could come out right now with a diesel-powered loco-

motive or a turbine-powered locomotive that had double the usual horsepower per axle, I think the railroads would go for it in a big way.

HOPPE: I think you are going to run into weight limitations on that, though.

Q: What about limits? Suppose you had a train capable of doing 200 miles per hour. Could you do it, would your rails stand it, would it stay on, would the flanges come off the wheels?

WILLIAMSON: I will beg your questions by saying that I would not talk about 200 miles per hour. I would talk about the difference between 40 miles per hour and 60 miles per hour. There aren't many freight locomotives today, diesel locomotives, so loaded that they can pull their trains on the level at much over 35 or 40.

Q: Isn't that a surprisingly low figure?

WILLIAMSON: I mean on the level. Take our gas-turbine electric locomotive hauling freight. This 4500-horsepower locomotive, again in round figures, will haul a 4500-ton train 45 miles per hour on the



WILLIAMSON: *There isn't any practical sort of atomic locomotive in the near future. One answer might be a stationary atomic-power plant. If we can get limitless power from some atomic source, the railroads will feel it in greatly increased electrification.*

One of the latest types of electric locomotives is this 360-ton, 11,000-volt job built by General Electric for the Great Northern. Electric locomotives have much higher efficiency than any other type ever built



JOHNSON: *It isn't the train that has the most speed that gets there the fastest. It is the train that has the power to maintain the scheduled running speed. Gas turbines can maintain their speed over some road conditions where a diesel can't.*



level. That assumes an average make-up of train, maybe two thirds loaded and one third empties. If it had 50 percent more power, you would only be moving around 55 miles per hour on the level. What is your freight speed limit, Al, 55?

HOPPE: It's 60 now on the main line.

WILLIAMSON: There are few places where people don't run faster than that if they can. We are just talking about getting the railroad speeds up to the speeds of trucks over the highways.

JOHNSON: Our speed is 50 to 55, but it isn't the train that has the most speed that gets there the fastest. It is the train that has the power to maintain the scheduled running speed.

Q: *Are you running your gas turbines any faster than diesel-electrics over the same run?*

JOHNSON: Yes.

Q: *Is it because they are capable of running faster or because you are just running them faster?*

JOHNSON: It is because they can maintain their speed over some road conditions where a diesel can't.

Q: *How many do you have on order?*

JOHNSON: There will be 25 eventually when GE gets through building.

Q: *Wasn't there some talk about converting gas turbines to propane?*

JOHNSON: There was and there is yet. That is almost a reality now.

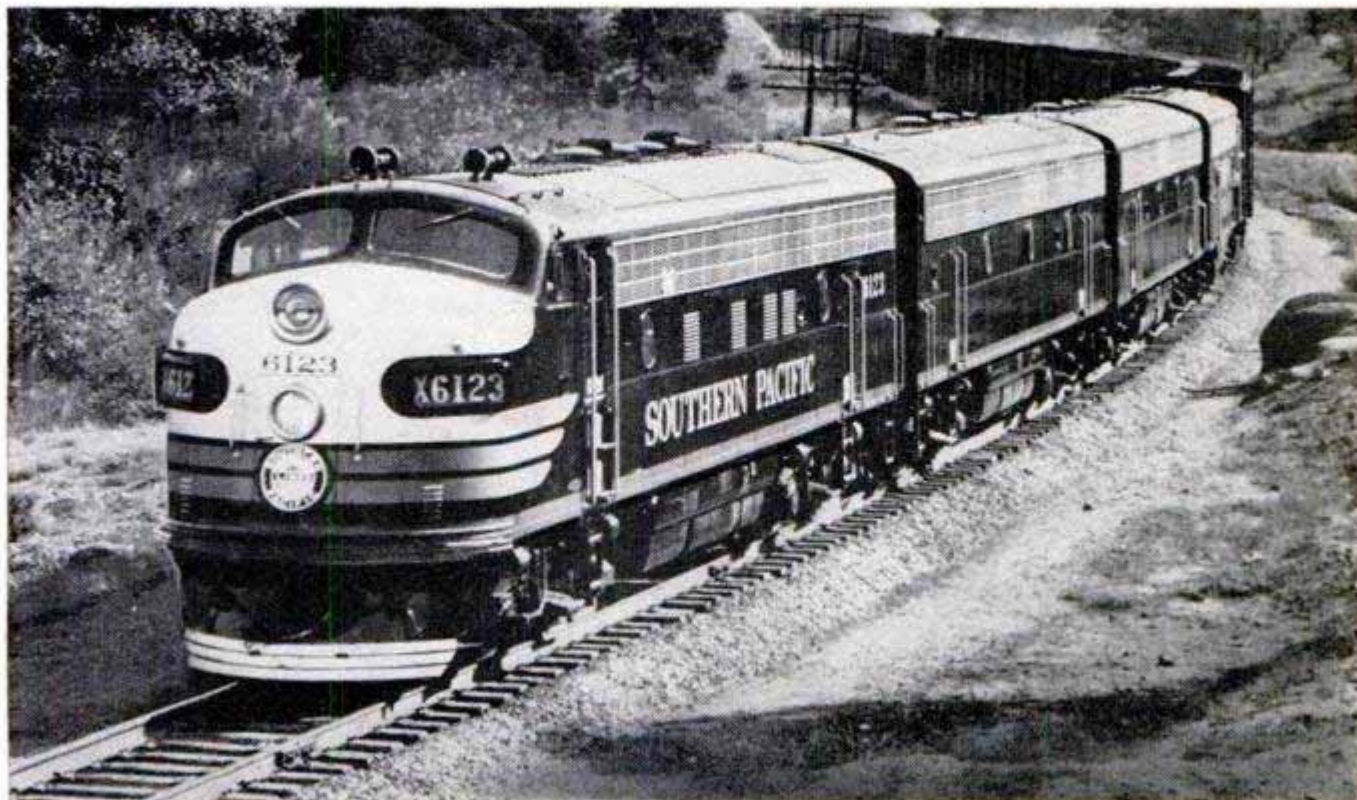
[The first propane-fueled turbine was tested a few weeks ago. Tests are described as "successful."]

Q: *Is it the idea that propane might be a cheaper fuel?*

JOHNSON: The story behind it is in the fuel situation. The fuel that we can burn in the gas turbine has some effect on the parts in the way of corrosion. Stationary turbines of the same type that have been running on natural gas get a much longer life out of the turbine rotor, the nozzles and all parts. It's a test to see if we can bring about that same condition on the turbine-electric locomotives. There is considerable propane available right now and I understand there is not too much market for it. In fact, a lot of refiners now are burning their propane gases to get rid of them.

HOPPE: I think you can say in a broad way that the gas turbine doesn't care what makes the air hot . . .

Work horse of the rails today is the flexible diesel-electric, which is assembled in units to pull any load





Westinghouse photo

Ignitron locomotive has tubes that convert alternating current from wire to direct current for motors

KERR: As long as that air is clean.

HOPPE: Even with heavy fuel oil there is a certain amount of ash. The British are approaching the coal-burning gas turbine in a way that might work. Instead of burning the coal directly to heat the air, they are heating the air separately by means of a heat exchanger, thus keeping the fly-ash out of the air that actually goes into the turbine. That, however, is another stage and another possible loss in efficiency.

KERR: Have you started to run a locomotive on propane yet?

JOHNSON: The whole thing is starting

to jell now in that we have acquired the tank car.

KERR: A tank-car tender?

JOHNSON: Yes, a special tank car for propane.

KERR: You don't have any problem with the I.C.C. or safety rules if you use a propane car.

Q: *It isn't any more dangerous to have those tanks of propane behind the engine?*

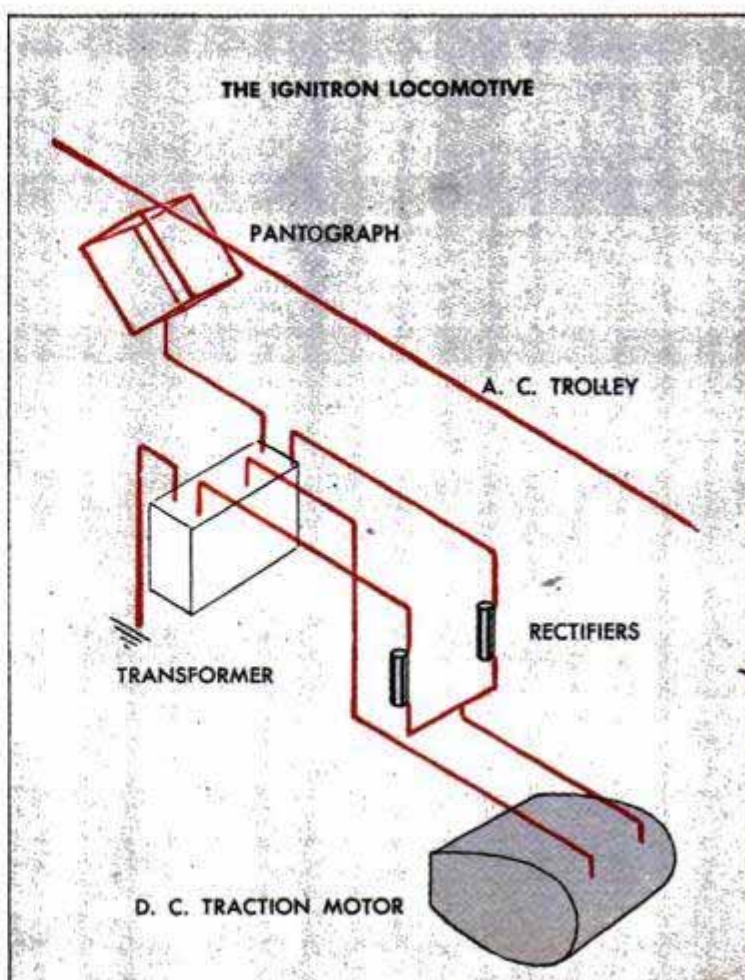
WILLIAMSON: It would be foolish to say that. Do you realize the danger in the back end of an automobile with 20 gallons of gasoline in it?



HOPPE: *In 1952, our coal-burning steam locomotives performed 22 percent of the switching, yet ate up over 50 percent of the fuel bill. It's all because the steam locomotives now are doing only the "cat and dog" work.*



Two of these Ignitron tubes serve as rectifiers for current to each traction motor, as shown in diagram



KERR: *An electrified railroad is still the best way to run a railroad we have ever known. You can make better schedules, you can pull bigger trains, you can pull them faster with an electrified system than with any other.*



Q: *What about maintenance of the gas turbines that you have now? Is maintenance as simple as it is with a diesel-electric? What about the crews, have they learned to handle them?*

JOHNSON: You can hardly, at this time, compare the maintenance on diesels and turbines. You have to consider this, that the turbine right now is a new locomotive. You have many bugs to take out of it. I would say this, in the maintenance of the turbine compared with the diesel: The turbine itself is much simpler. If you look at a diesel engine, it has how many reciprocating parts? About a thousand of them?

HOPPE: Each connecting rod consists of a whole hatful of parts.

JOHNSON: But the turbine is a straight axle rotating in one direction. When the gas turbines become more widespread, it will be simpler to service them.

Q: *One thing more about speed. Has any thought been given to increasing speed of passenger trains? What about track limits?*

HOPPE: I don't think that your track enters into it too much. There is a limit to what you can do with trucks and keep them riding comfortably.

KERR: Here is one of the places where you use horsepower. No railroad is level. If you take a train that can run 100 miles per hour on the level, the train may go down to 50 miles on a fairly heavy grade. You get places where you have these long grades and you lose a tremendous amount of time. You can double your horsepower, and that is where you are going to save time by keeping an even speed rather than raising the top speed.

Q: *The trend is going to be to increase your timetable efficiency rather than your top speed?*

HOPPE: Yes, so the over-all schedule can be shortened.

WILLIAMSON: Would you consider a 20-mile-per-hour increase in speed, let's say, a spectacular one?

Q: *If it halved your time between stops, I suppose it would be spectacular. Would it take a big increase in power to do this?*

KERR: It would take 50 to 60 percent more horsepower.

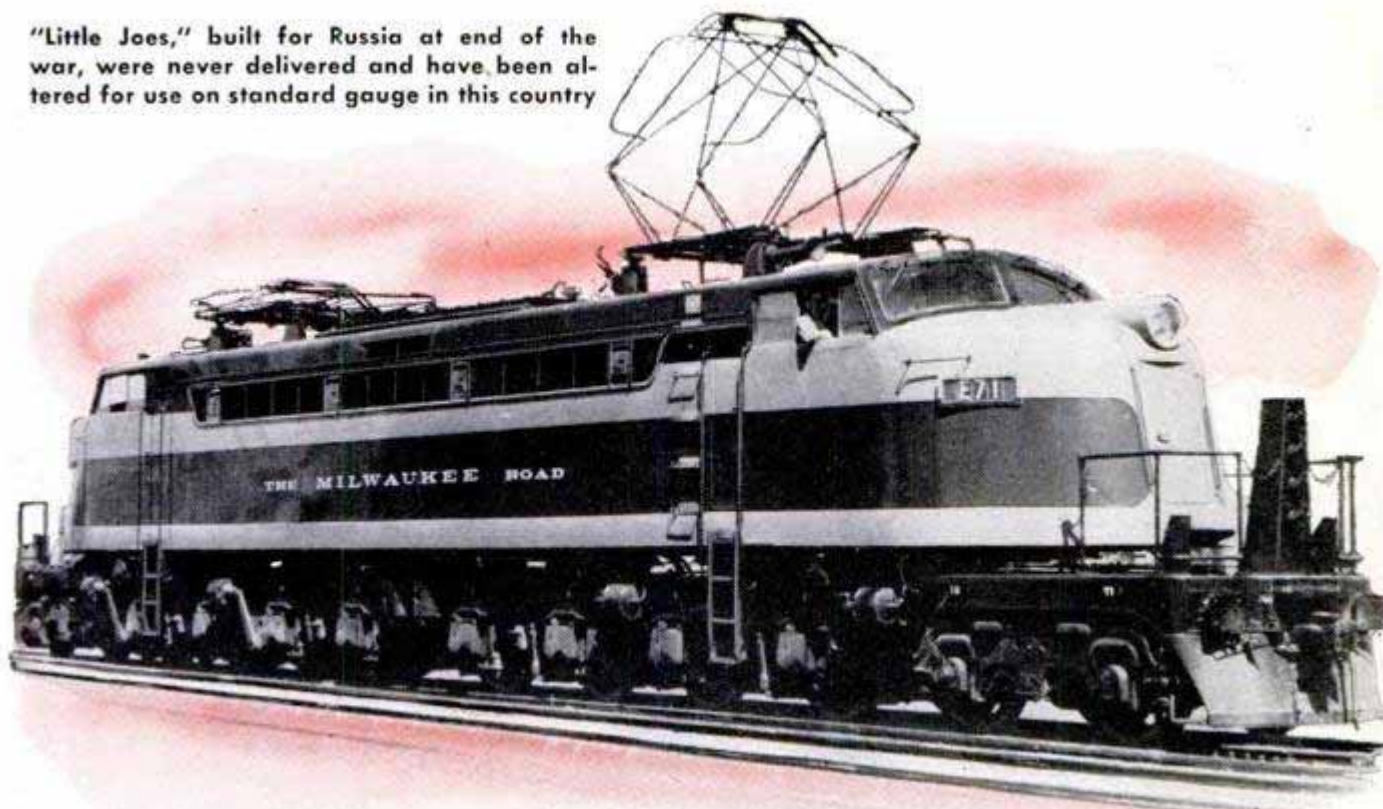
Q: *To increase it 20 miles per hour?*

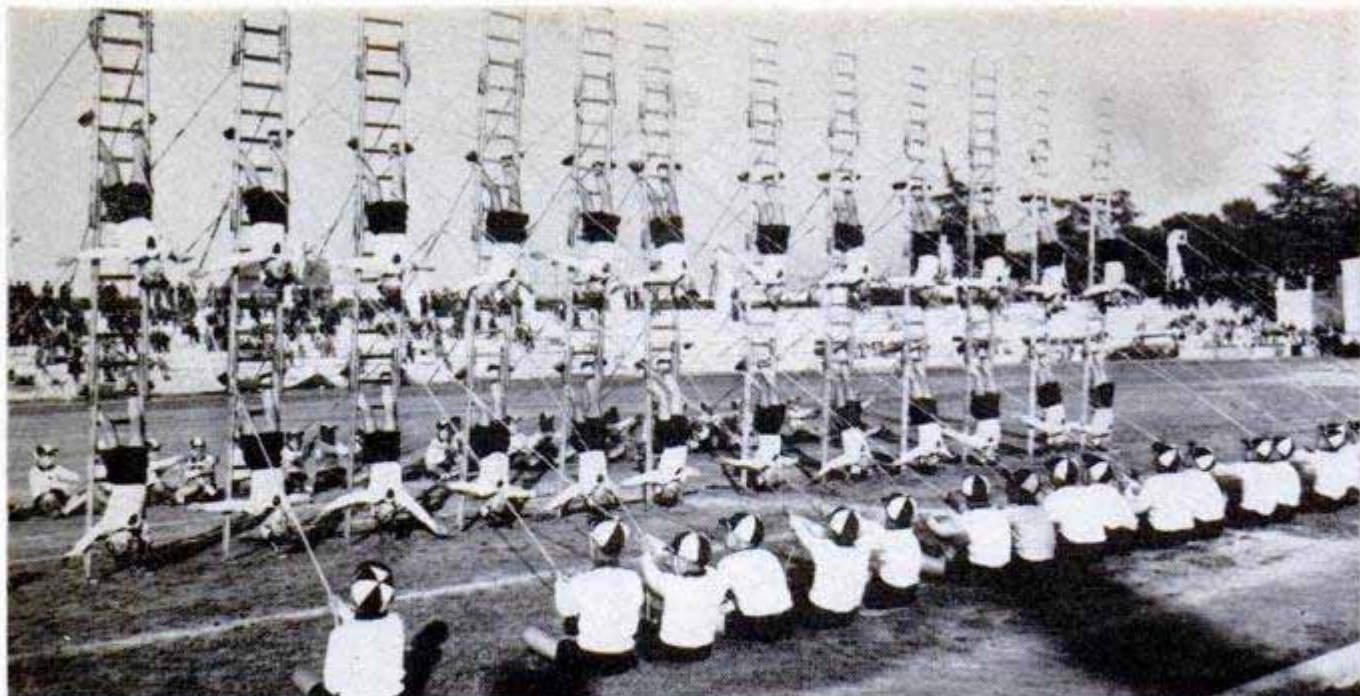
KERR: Yes.

Q: *Before we leave turbines, what about*

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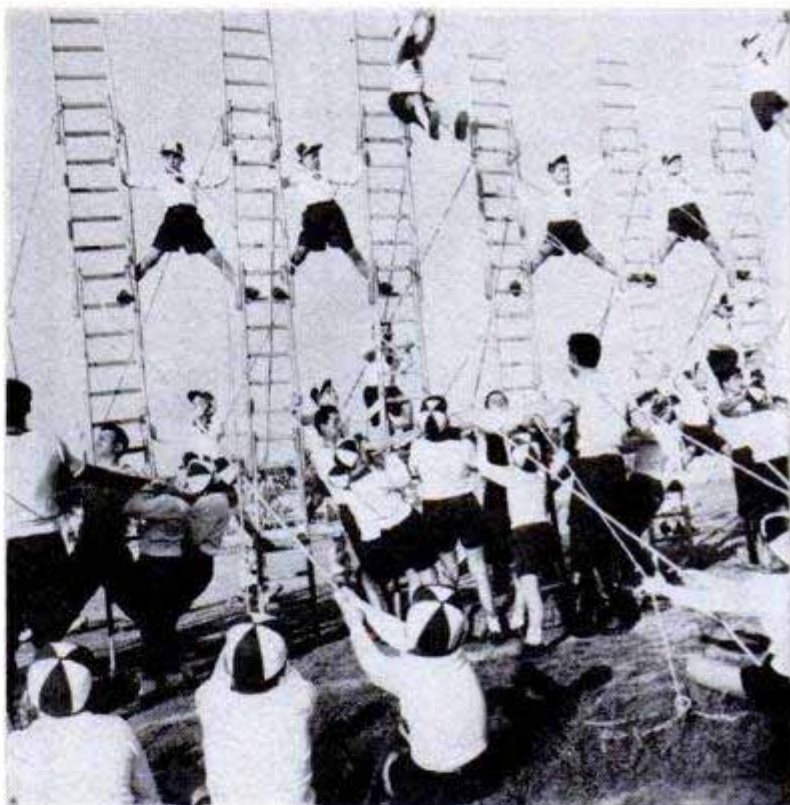
"Little Joes," built for Russia at end of the war, were never delivered and have been altered for use on standard gauge in this country





Italy's Small-Fry Firemen Show Off Their Training

Italy boasts some of the best-trained firemen in the world. One reason for their excellence is that they start training when nearing their teens. Youngsters selected from the Firemen's Orphanage are taught the fundamentals of fighting fires and rescuing people. At the conclusion of their training the young firemen put on a special show, not only demonstrating their proficiency at fire fighting but also their athletic ability. Ladders are run up and held in place by many of the youngsters while others do acrobatic tricks and leap into fire nets. The young firemen have no fear of jumping from the top of a ladder into a net held by their buddies. Instructors—real firemen—stand by as a precaution.



No Waterwings Needed With This "Swimming Suit"

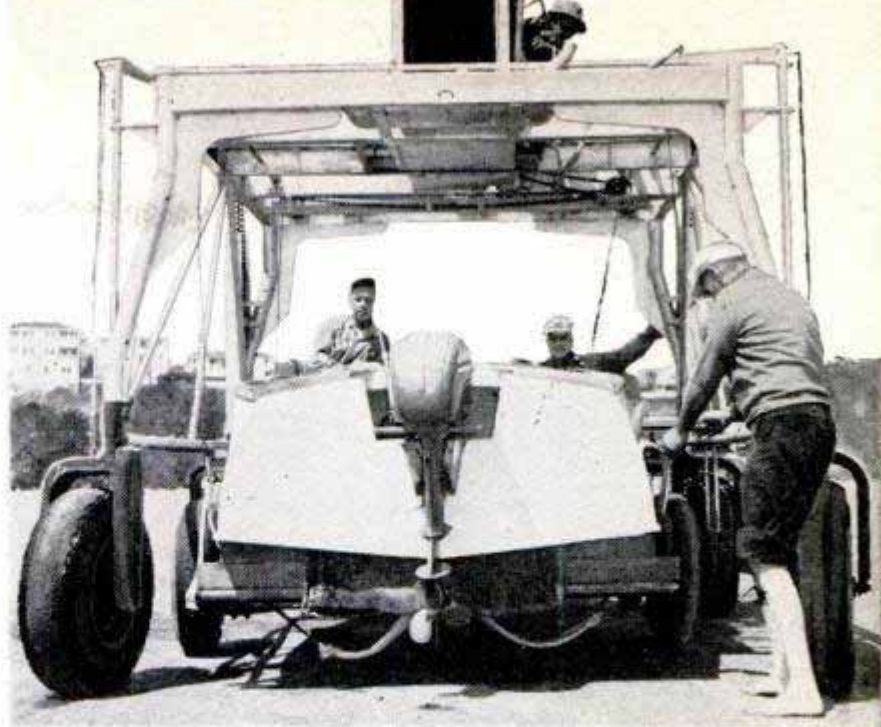


Clothing made of a new fabric will support the wearer in the water, according to the manufacturer. Developed by the British government, the fabric is a tightly woven cotton with 90 threads to the inch instead of the average 50 threads. A swimming suit of the material is on sale in England, and will take in air but will not allow the passage of water.

BOAT-LIFT

Rolls Into Water

When the Boat-Lift is positioned over the trailer, canvas straps are fastened around the hull and the boat is carried toward the water



TO SMALL-BOAT ENTHUSIASTS, the bane of every week end is hoisting the boat off of and onto the trailer and toting it into and out of the water. Sam Davis, a San Pedro, Calif., inventor, has devised a machine (also shown on cover) that will do the job automatically in little more than a minute. Called the Boat-Lift, the new machine resembles an oversized lumber carrier and it operates on the same basic principle.

The Boat-Lift is driven over the trailer-borne craft, straddling it, and two canvas straps are cinched around the boat's hull. An 85-horsepower truck motor, supported by a pair of steel members across the top

of the machine, operates a power take-off which lifts the boat from the trailer.

Riding on 34 by 9.9 aircraft tires, the Boat-Lift carries the craft across the beach and into draft-deep water, where it is lowered. Slotted-metal landing mats stretched across the soft sand keep the heavily burdened Boat-Lift from bogging down as it moves to the water's edge.

Constructed of steel pipe and channel steel for lightness and strength, the machine is 10 feet long, 8 feet 4 inches wide and stands 8 feet 4 inches tall. The Boat-Lift will handle small craft up to 22 feet long and 5 feet high, with a beam of 7 feet and weighing 3000 pounds.

Once in deep enough water, the boat is lowered and the straps undone. Device handles craft up to 22 feet long and weighing 3000 pounds



WHAT'S NEW FOR

Your Home

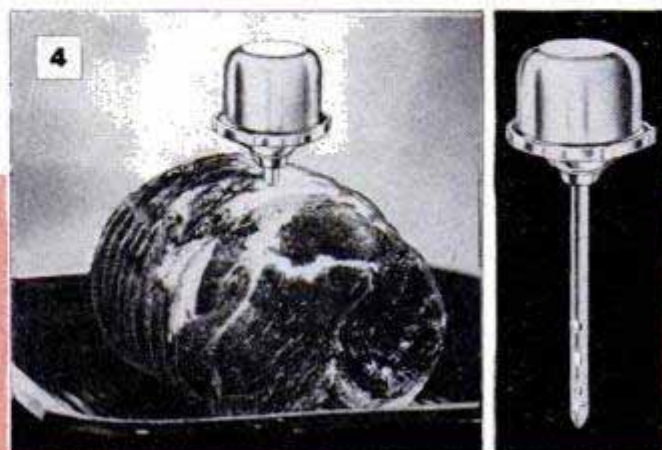
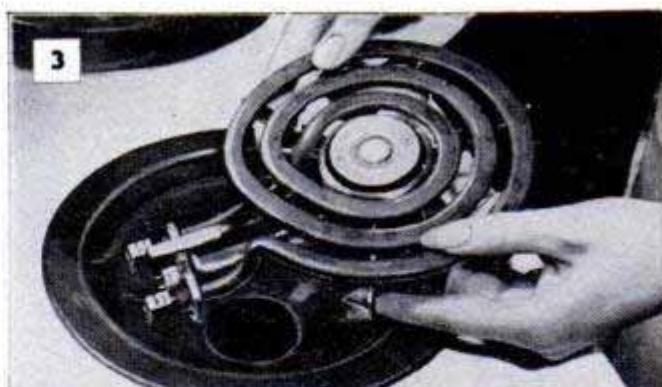


1. GARMENT HOLDER presses your pants as you sleep. The trousers, folded neatly, are held under pressure overnight to intensify the crease. The unit provides a hanger for a coat, space for shoes and a utility rack to hold wallet, change, jewelry and other miscellaneous items. Casters give rack mobility

2. ICE STOPPER is clipped into a drinking glass to prevent ice cubes from sliding down into your face as you drink. Made of bright-colored transparent plastic, the device consists of a circular strainer mounted on a clip which fastens onto the edge of the glass. In several colors, clips serve as drink markers

3. RANGE UNIT protects food from scorching or burning even though all the water boils away. The unit measures the temperature of the food being cooked and turns the burner off and on as needed. Controlled by a dial with three cooking zones, the burner can be adjusted for warming, boiling or frying

4. PRESSURE SEASONER for roasts forces the seasoning into all parts of the meat. Seasoning is sealed inside pressure container mounted on a shaft which is plunged into the meat. Steam from the meat enters the shaft and builds up pressure inside the container, diffusing condiment throughout the roast





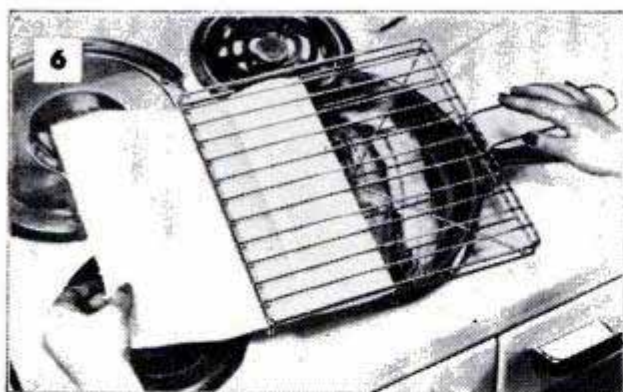
5. WALL CABINET mounts on hanger strips that are fastened to the wall, making installation or removal easy. Each strip has slots into which hooks on the back of the cabinet fit to provide suspension at several points. Cabinet is equipped with sliding doors of frosted glass and a unit in its base which lights interior and surface below, contains outlets



7. CLOTHESPIN BAG is neat, rustproof and stain-proof, is designed so that pins may be removed from any side or from the top. Made of decorated vinyl, bag is fastened at corners to sturdy aluminum ring which mounts hook that fits over clothesline and slides easily. Capacity of the vinyl bag is over 200 clothespins, enough for the biggest basket of laundry

6. RACK holds paper toweling which absorbs grease and kitchen odors. Placed on top of the frying pan, it prevents grease from spattering from the pan onto range, walls and counters. As a pot holder, it catches drips and crumbs from cooked foods. Inside the oven it keeps foods crisp and warm. Best feature is the dish washing it saves. Towels are quickly replaced

8. RANGE HOOD for home use catches and exhausts cooking odors, smoke and grease vapors. Baked-enamel finish is grease-resistant and easy to clean. Made to suit all range conditions, it is simple and easy to install. Grease-stop filter is washable aluminum and can be quickly cleaned in the dishpan. Fan is large enough to keep cooking area free from fumes





Tiny German Roadster Weighs 300 Pounds

Excess weight and unnecessary frills are missing from a two-passenger German roadster. So much has weight been reduced that the 300-pound car can be lifted into a tight parking space by its driver. It has a top speed of 40 miles per hour and is powered by a one-cylinder, two-stroke engine of eight-cubic-inch displacement.

Truck Boasts 41 Instruments

Forty-one dashboard instruments—meters, gauges, lights, buzzers and switches—help Nick Architect of Portland, Ore., check his truck's mechanical condition. Many of the extra instruments are from aircraft parts. A plate in the center of the dash contains the light switches, with buttons for each circuit directly below. On a ledge above the dash is a combination tachometer and speedometer that records all gearshifts, engine speeds and truck speeds.



School Bus Turns Dump Truck

Corncobs and cattle feed form the principal cargo of an ex-school bus which has been converted into a dump truck by an Illinois farmer. Everett Bailey of Pontiac, Ill., had an old hoist and grain box which he wished to place on another chassis. He bought a used school bus on sale in a nearby town, cut off the bus body right behind the driver's seat, boarded up the opening with one-inch lumber and mounted hoist and grain body on the school-bus chassis.



Rubber-Tired Engine Runs on Roadbed to Switch Freight Cars

Making up freight trains is a clean, quiet job when a powerful rubber-tired tractor replaces the old-fashioned switch engine. Power is provided by either a gasoline or diesel engine. A torque converter transmits power to the wheels, automatically adjusting the torque multiplication according to the weight of the boxcars. The compact car juggler is designed for use in factory freight areas to push freight cars around for loading, unloading and making up trains.



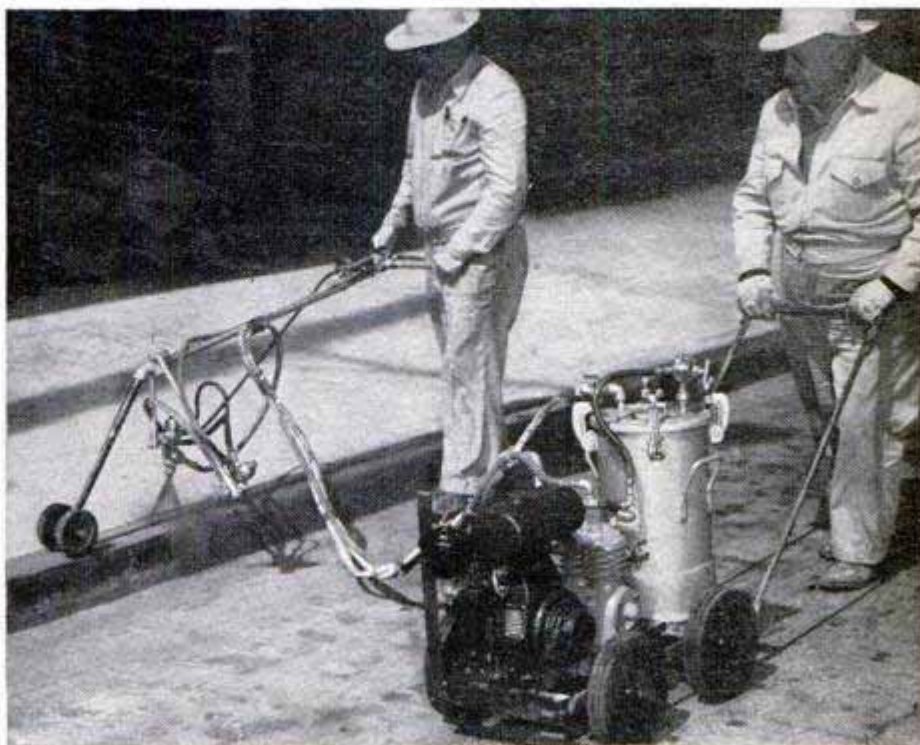
Out-of-Line Wheels Keep Mower Level

Staggered front wheels on a new rotary mower help keep the blade at a uniform height above the ground even on rough lawns. This prevents scalping the turf on ridges and high spots. Constructed mainly of aluminum, the mower weighs only 40 pounds. It has an 18-inch blade powered by a 1½-horsepower motor. Clippings are sprayed out the front of the mower.

Curb Painter

Curbs in Culver City, Calif., are painted as fast as a man can walk by the use of a special spraying rig. Paint and pressure apparatus are contained in a cart wheeled alongside the device. Hoses lead to nozzles placed to spray the proper area as the curb painter is wheeled along on top of the curb. Paint feed is controlled by a trigger on the handle of the painter.

☛Setting a new jet-altitude record, Britain's two-engine Canberra bomber has soared to a height of 63,668 feet.





Two-Way Radio Speeds Construction

By Harry Bernstein

Two-way radio mounted beneath the dash of this project manager's car enables him to keep in touch with foremen at all times

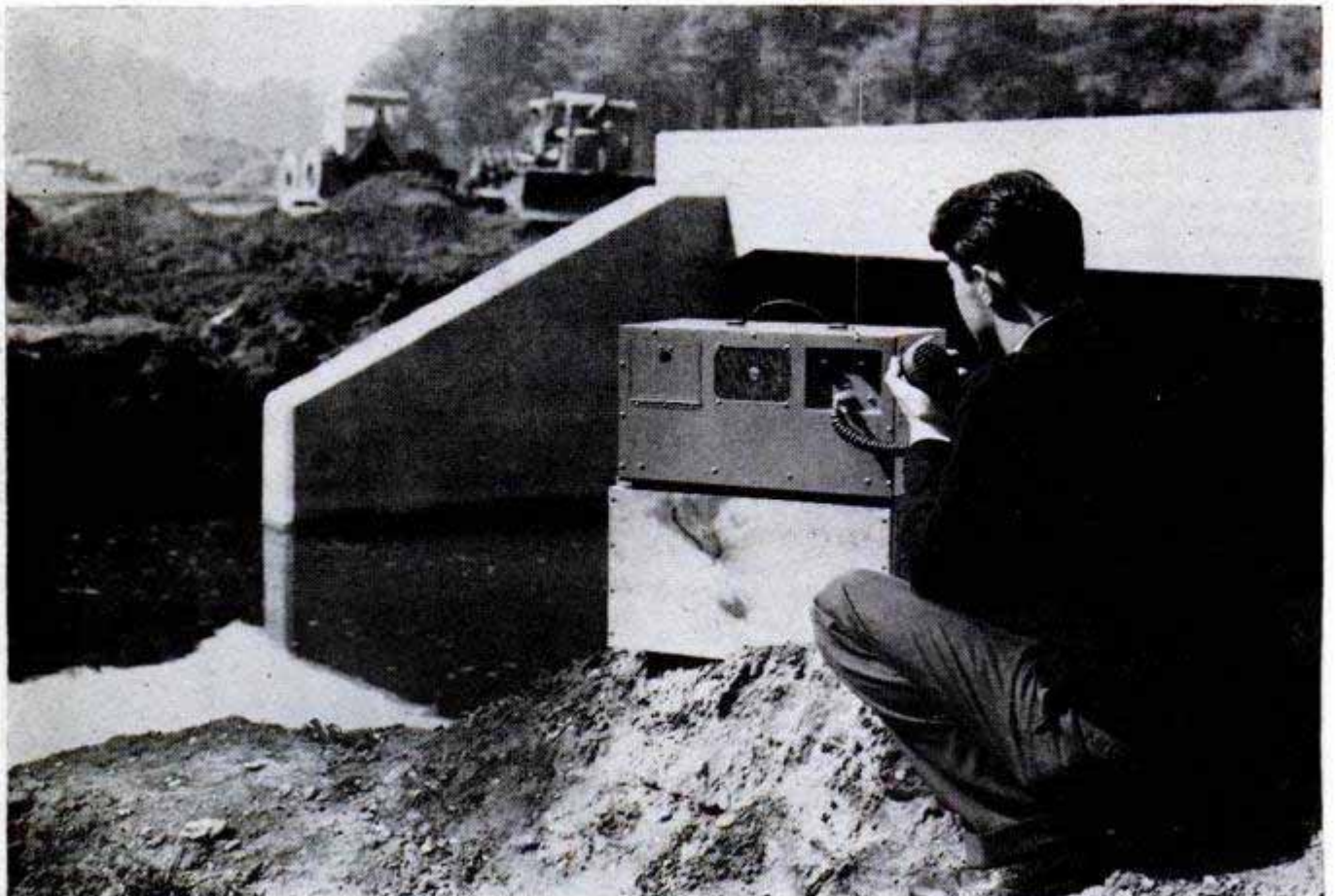
WORK CAME TO A HALT one day along a stretch of roadway during the building of the New Jersey Turnpike—a grader had broken down and repairs were urgently needed. A few moments later, the driver was talking by two-way radio to a mechanic 15 miles away, outlining the trouble. Within the hour a repair crew had arrived at the scene, fixed the grader and departed.

Time was at a premium during the construction of this 118-mile superhighway—

to shorten the delays the builders were using a valuable new tool that has found wide favor with contractors directing far-flung operations. Ten dispatching stations, each with a radius of 20 miles, and more than 40 mobile two-way radios were employed to form an efficient intercommunication network.

During a recent windstorm in Delaware, countless roads were blocked by trees. Highway crews saw the obstructions and radioed crane operators who removed them.

Complete sending and receiving equipment is contained in this portable unit, carried around like a suitcase



Three types of two-way radios are used in construction work: Portable sets, mobile units and base stations.

Within the immediate construction area, workmen talk to each other by miniature hand-carried units or small, compact pack sets weighing 10 to 20 pounds. The larger mobile units are usually mounted in moving vehicles and are in touch with the base station, permanently installed at the central or field office and equipped with an antenna tower on the roof.

When a new building is being erected or an old one demolished the two-way radio enables a worker on the tenth floor to get immediate instructions from the ground or send for needed tools. Even oil drillers are finding the two-way radio invaluable. After a drill pipe had twisted off in the shaft, a rush radio call brought a crew which removed it before the cuttings could settle and "freeze" the pipe in the hole. ★ ★ ★



Radioing to foreman on the ground, construction worker uses a walkie talkie with integral whip antenna and shoulder strap. Units like this weigh from 10 to 20 pounds. Below, mobile shop equipped with a single-package two-way radio is notified immediately of trouble, speeds to scene



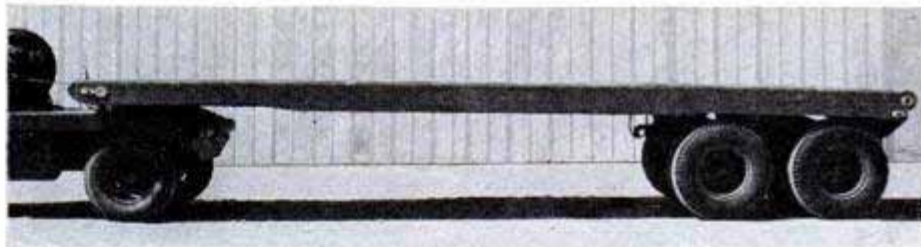
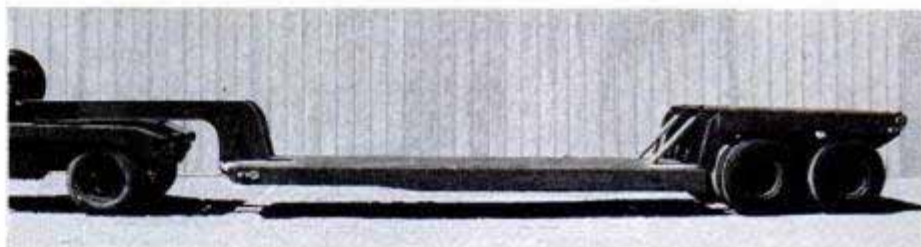
Lenses in Series Aid Sight of Many Near-Blind Persons



Two or three lenses, set one-eighth inch apart, form a new type of spectacle that may give adequate eyesight to about half the 150,000 near-blind persons in the United States. The glasses, announced by Dr. William Feinbloom of Columbia University, enable some persons with as little as two percent vision, to read newspapers, watch television and work in ordinary jobs. The lenses are much thicker than ordinary spectacles but are set in a similar frame.

Detachable Gooseneck Enables One Trailer to Do Two Jobs

In about 10 minutes, a driver can change a convertible trailer from a standard float body to a lowboy truck. By use of a gooseneck and a hinge mechanism, the trailer bed is lowered 34 inches and rigidly locked into position. The only equipment needed to make the change is a winch line from the tractor. The detachable gooseneck is moved out of the way with a winch.



German Ford Convertible

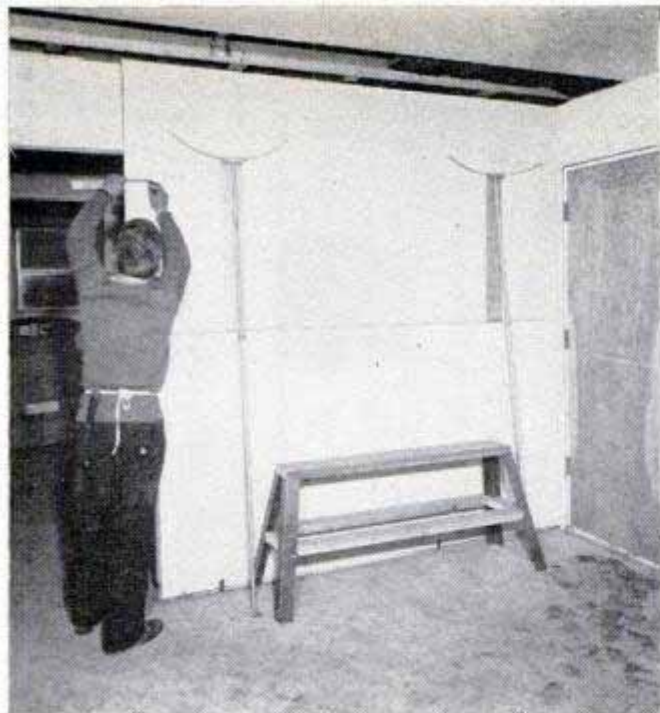


Its side panels and fenders showing a faint resemblance to its American cousin, the German Ford has a four-cylinder engine

Color-Changing Paints Record Engine Heat

Paints that tell the temperature are being used to locate hot spots in aircraft engines. Several different paints, each formulated to change color permanently at a different temperature, are applied in small spots or stripes to an engine part. Vivid color changes register the maximum temperature reached during an operation. Used where thermometers or thermocouples are impractical, the paints are also helpful in the design of heat-exchanger equipment and warn of dangerous temperatures.

Twenty-four elephants have been flown from Bangkok to New York, at an average fare of \$1200.



Wallboard Holders Keep Panels in Position During Nailing

Wallboard panels are held against the ceiling for adjustment and nailing by a jack which raises and holds a 4 by 12-foot gypsum board. The device consists of a base that rolls on casters, an easily operated jack assembly and spring-steel spider arms to hold the board. The jack contracts to six feet or can be extended to nine. Telescop-

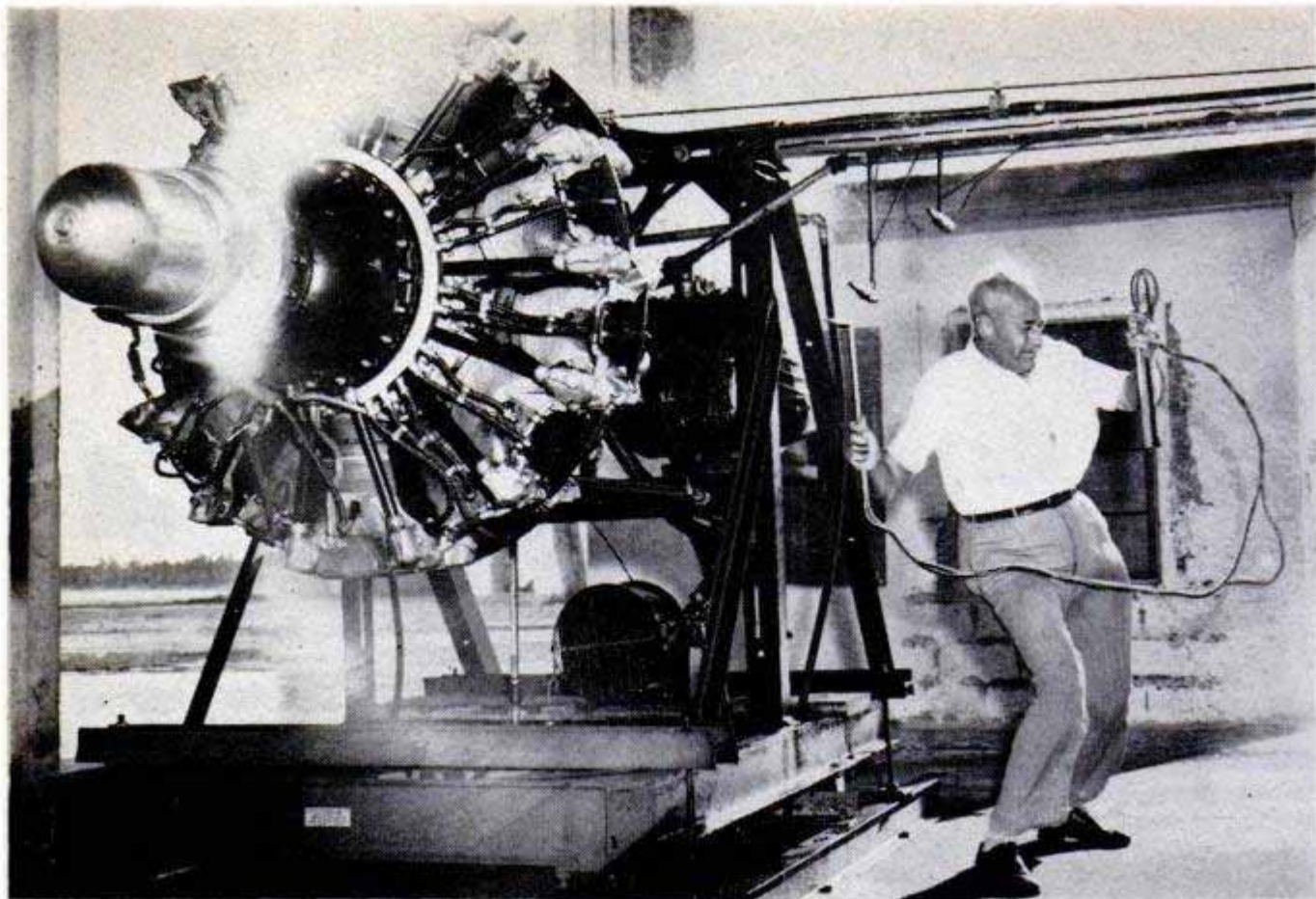
ing pipe standards, each with a spring-steel arm at the top, may be used to hold the boards against the ceiling once they are in position. A steel clamp for side-wall use attaches to the top of a pipe standard and grips the bottom edge of a wallboard to hold it firmly in place against the wall as it is nailed to the studding.

Plastic and Leather Racing Saddle Weighs Only a Pound

No horse can notice the added weight of a new plastic and leather saddle which tips the scale at an even one pound. Constructed of Vinylite plastic sheeting attached to a leather base, it won't absorb moisture and is unusually resistant to slipping and sliding. The long, flat seat and large flaps are designed to fit the crouching position used by jockeys in track riding.

Eddie Arcaro weighs in with new one-pound saddle. → Saddle consists of leather base covered with plastic





Dr. H. H. Sheldon bucks a 100-mile-per-hour gale in his hurricane laboratory at the University of Miami

HURRICANES

WHEN THE NEXT big blow hits Florida a few roofs will come off, but the biggest damage in dollars and cents will come from water. The storm-driven rains will spurt in around casements, under doors and even through walls. Woodwork and furnishings will be ruined to a tune that will total millions.

In the past, there wasn't any way to tell whether a window would leak in a roaring 100-mile-an-hour hurricane or not—except to wait for one to come along.

Now research men have conjured up a pint-sized storm with all the punch and meanness of the real thing, except for a convenient switch for shutting it off. A test blast with winds hitting 120 miles per hour will tell in a hurry how much hurricane stamina a window has. The amount of damaging water that gets through is quickly checked. An anemometer measures air infiltration and special gauges record strains on the glass and frame. In fact, you can find out a lot more about your window in one of these simulated hurricanes than you ever could when faced with a real storm.

Home builders are learning that it pays to specify storm-tested installations wheth-

er they live in the middle of the hurricane belt or not. Every year dozens of storms burst down on the inland "protected" states. Unlike hurricanes, where warning is had in plenty of time to get ready, these storms usually come as a surprise. Your windows, your roof, your house has to be able to take it or else. That's why more and more manufacturers are shipping their products down to the University of Miami and the University of Florida, at Gainesville, for storm testing. Windows, awnings, television aerials come in from Chicago, Louisville, New York to get the works.

The "works" is a *real* test. The product, window or whatever, is installed in a test building just as it would be in your home. Then an airplane engine off to one side (1200 horsepower at the University of Miami and 1300 horsepower at the University of Florida) stirs up a whirl of eddying air currents and a vertical torrent of spray equal to a four-inch cloudburst, simulating the worst kinds of hurricane conditions. Old-timers around south Florida have watched the University of Miami's hurricane lab in operation at the invitation of Dr. H. H. Sheldon, an experienced hand in



Jeep's radio antenna bows before a hurricane blast in radio-equipment test at the University of Florida

ON LEASH

By
McGregor Smith, Jr.

hurricanes himself. Men who lived through big blows that took hundreds of lives in the 1920s agree that the university has produced the real McCoy. Sustained winds of 70 to 100 miles per hour with gusts up to 120 accompany the test.

I went down to the University of Miami's South Campus with Prof. Albert Hainlin and Henry Rust to see a hurricane lab in action. Professor Hainlin is head of the lab and Rust, his assistant, keeps the big Pratt and Whitney engine churning up a man-made tempest to sorely try a designer's ingenious attempts to baffle the weather.

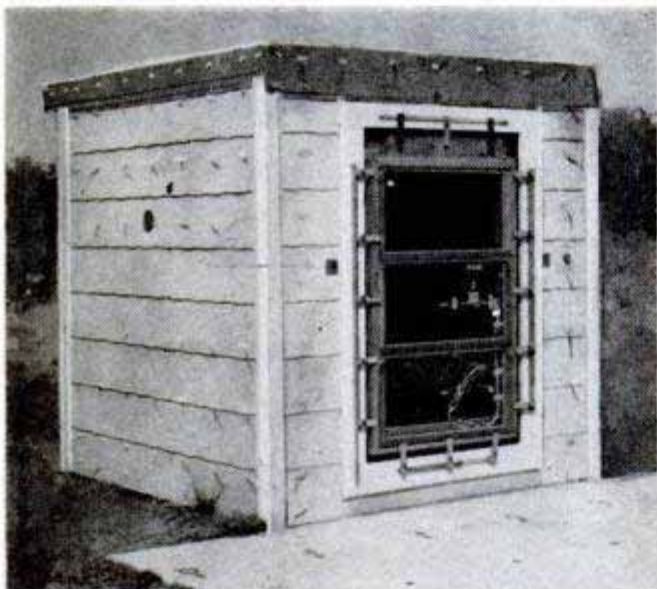
The main lab is situated in the massive ruins of the once-famous Richmond Field Naval blimp hangars. The two huge buildings housed sub-hunting Navy blimps during the early part of World War II. Both were destroyed by fire in the midst of a raging hurricane. Now, in the shadow of the towering skeleton, the muffled thunder of Miami's hurricane lab awakens an echo of the furious winds that ripped the great hangars.

Lab technician installs hurricane shutters during test to show terrific force of a synthetic storm





Metal hood fastened inside window for a hurricane test contains instruments and gauges for seepage which are read carefully by an engineering student



Strain gauges attached to window record stamina of every part of construction. Below, an oscillograph chart for window strain is checked during routine test by an engineer at the University of Florida



When we reached the lab site a truck was parked beside the test building, a sturdy 12-foot by 12-foot cement block structure. A newly designed glass jalousie-type window was unloaded from the truck. Men from a local company installed the window in the test building next to a conventional casement type used as a "control."

Professor Hainlin, three representatives of the manufacturer and I huddled in the test building while Rust warmed up the engine. Suddenly a red light flashed on and a clanging of bells rang out in the crowded room. We heard the engine roar to a high pitch.

The wind rose to 100 miles per hour. A torrent of spray hit the window, and outside a milky haze frosted the glass. The watchers pressed close to see where the leaks would come. Here they were seeing for themselves how their product would stand up under the worst possible conditions; what they would learn would be translated on the drawing board into an improved product.

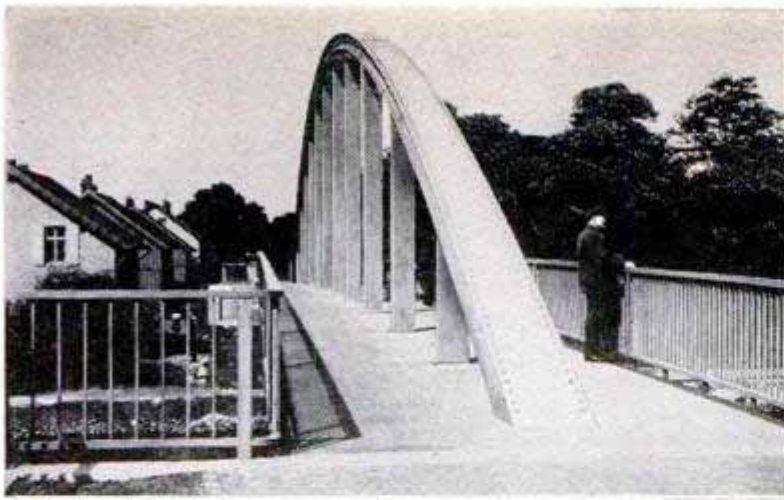
Behind the window was fastened a heavy galvanized hood to funnel air that entered the glass jalousie into a narrow six inch passage. In this passage an anemometer was placed to measure the exact amount of air infiltrating the window. A trough below the hood collected all water entering during the test.

Again the red light flashed and the warning bell sounded. The engine made a throbbing noise as Rust started the needlelike hand on a stop-watch sweeping around. The men inside the test building stood together watching the dial of the anemometer. The black indicator crept forward and a film of water spread over the bottom of the trough. For 10 full minutes water and wind came steadily at 100 miles per hour, then for two minutes the strain was at its greatest with gusts of 120 miles per hour.

Suddenly the engine coughed and stopped roaring. The test was over. Professor Hainlin checked the reading on the anemometer and measured the water that had drained into the trough. The official results would be processed and turned over to the manufacturer within a week, but those who had watched the test already knew what they needed to know to work out any bugs in the window's design.

After the test we went back to a store-room near the ruins. Here a sample of each installation tested is kept by the university. An aisle passes between two rows of jalousies with glass, wooden and metal louvers, casement windows, awnings and storm shutters. All have stood up against hurricane-force winds and torrential rains. Those which passed the lab's rigid test are

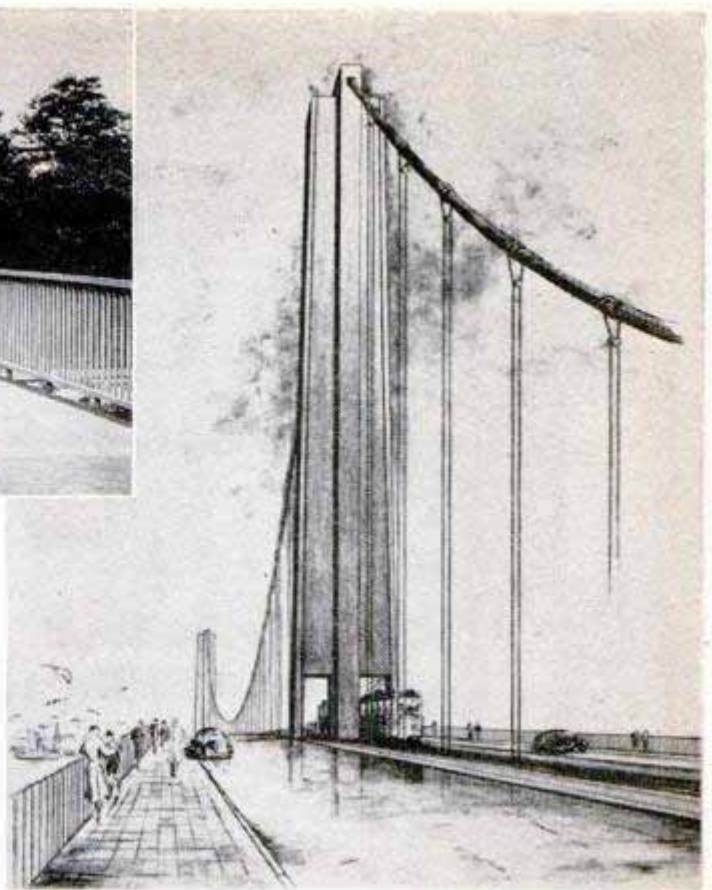
(Continued to page 226)



Little foot bridge above is forerunner of highway bridge shown in artist's sketch at right. Supports for single cable rise through roadway

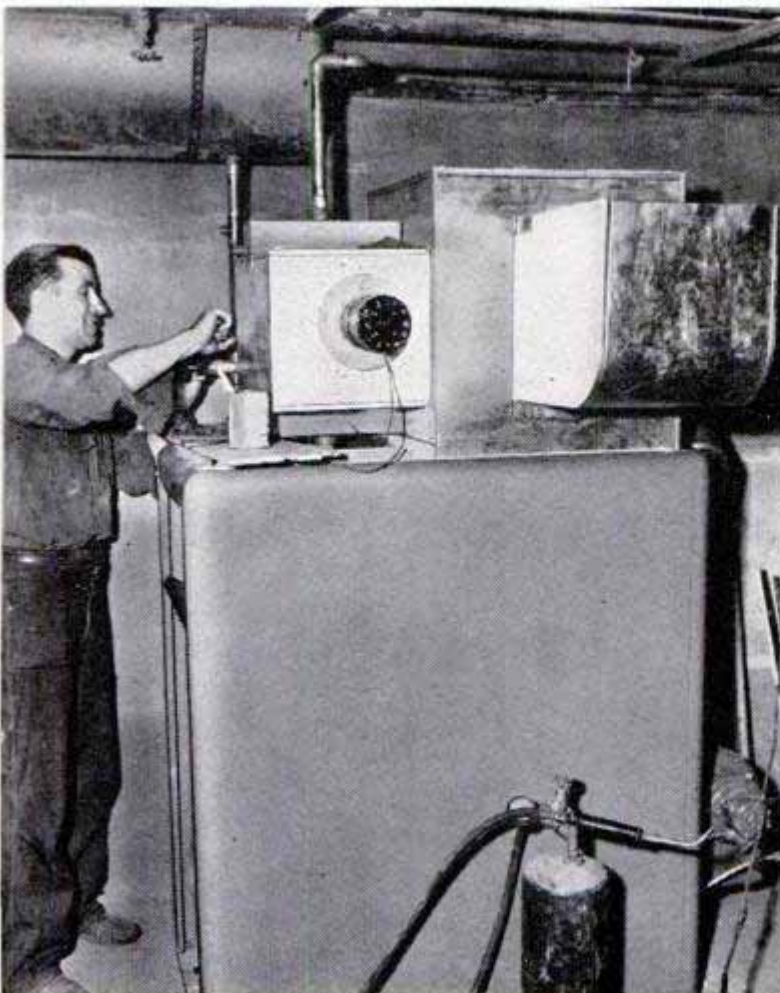
One-Cable Suspension Bridge Will Have Split Roadway

Only one major cable will support a suspension bridge to be built in Stockholm. Instead of having a cable supporting each side of the roadway, the new bridge will be suspended from a single cable over the center of the roadway. Supporting columns will be built right up through the middle of the bridge. The design was chosen over 195 others entered in



a contest. To prove that a single-support bridge is feasible, a small pedestrian bridge was built near Wanne-Eickel, Germany.

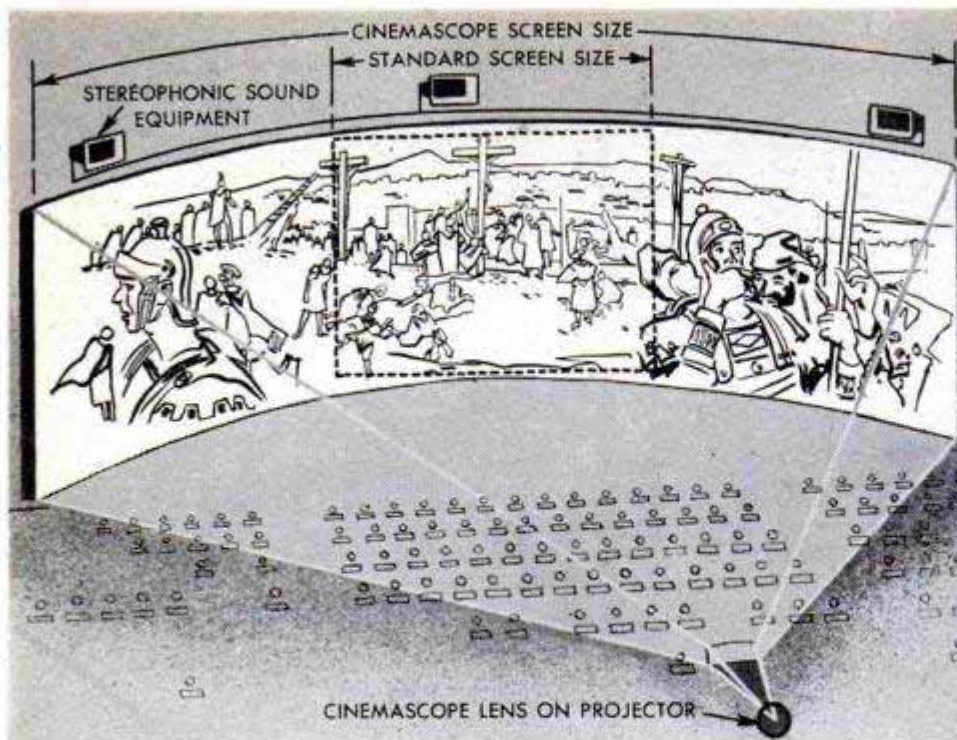
Hot Water Generator Receives Heated Air From Furnace



Mounted on the top of any warm-air furnace, a hot water generator is supplied with heat from the plenum chamber. In the summer, when hot water alone is needed, heated air from the furnace is prevented from going upstairs by a special damper. The unit consists essentially of finned copper coils through which the water circulates and a centrifugal fan that draws the heated air from the plenum chamber over the coils. An insulated tank is connected at the side. The unit can also be used to supply hot water to an auxiliary radiator.

Paint Tires to Match Car

Sidewalls of automobile tires can be painted any of five colors to match or complement the body color. The paint can be mixed with white to make soft pastel shades. It is easily applied with a brush. Owners of two-tone cars should paint tires to match the top color, others should select a color that harmonizes with the body.



CONVENTIONAL 35-MM. FRAME



CINEMASCOPE 35-MM. FRAME

Hollywood Seeks "Three Dimension" Movies Without Glasses

Hollywood is experimenting with several projection systems for giving the illusion of three dimensions without the expense of dual filming and projection or the nuisance of asking the audience to wear special glasses. One method under test by Twentieth Century-Fox uses a camera lens that compresses a wide-angle scene onto regular 35-millimeter film. Then, when the

movie is projected, a compensating lens spreads the scene out to full width on a wide, curved screen. Normal scenes are 30 degrees wide as compared to the eye's 75-degree angle of vision. The Twentieth Century-Fox system, called CinemaScope, has a width of 90 degrees. Cinerama, the system which started the rush toward wide screens, has a screen 140 degrees wide.

Camera Automatically Adjusts Aperture for Correct Flash Exposure

Flash photography is made virtually foolproof by a synchronized camera that adjusts its aperture automatically as the lens is focused. The 35-millimeter Bolsey camera operates with any standard film, black and white or color. The camera is especially valuable when taking flash shots of moving subjects because as the photographer keeps the subject in focus with the range finder,

he is automatically adjusting his lens aperture for the proper exposure. When the subject moves too far away for the flash to provide sufficient light for a good picture, the range finder no longer can be focused, thus preventing the photographer from wasting film and bulbs. The device makes it unnecessary to compute distance and divide into guide numbers.





Customer can tell at a glance what reservations are still available on trains for one week in the future

Quick-Service Rail Tickets

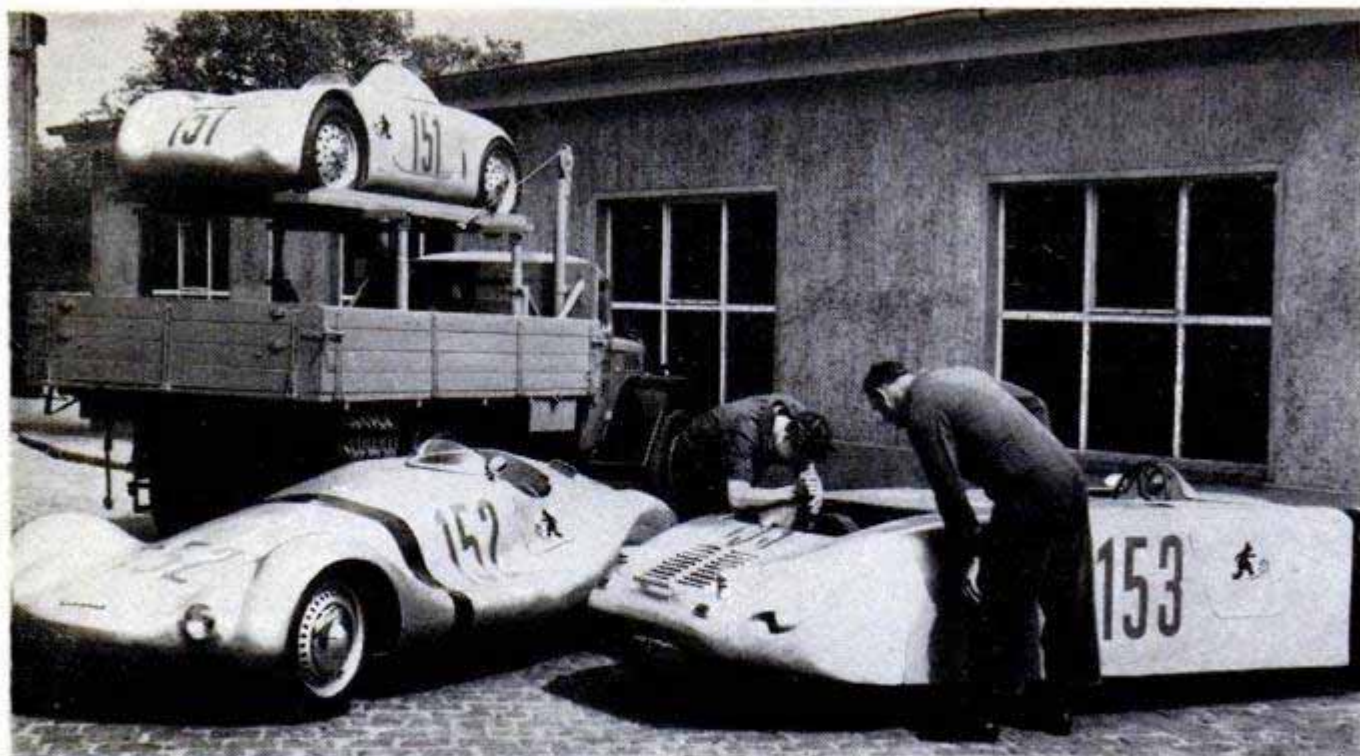
TRAVELERS SEEKING train reservations are given superquick service in the new Pennsylvania Railroad ticket office at Pittsburgh. The facilities drastically cut the time required to make a reservation. An overhead board shows the customer all the accommodations available on principal trains for one week in advance. As spaces are reserved, their code designations are removed from the board. One coupon representing each space is placed in a rack weeks ahead of train departure. When the space is sold, the only available reservation disappears from the rack. All tickets are printed by machine instead of by hand. Another timesaver is a microfilm machine that produces in four seconds the route and fare to any one of 6500 rail points.



Rack holds single coupon for each space

Below, ticket is printed in seconds by machine. Right, machine quickly produces route and fare information





Ground-Hugging German Racers Powered by Porsche Engines

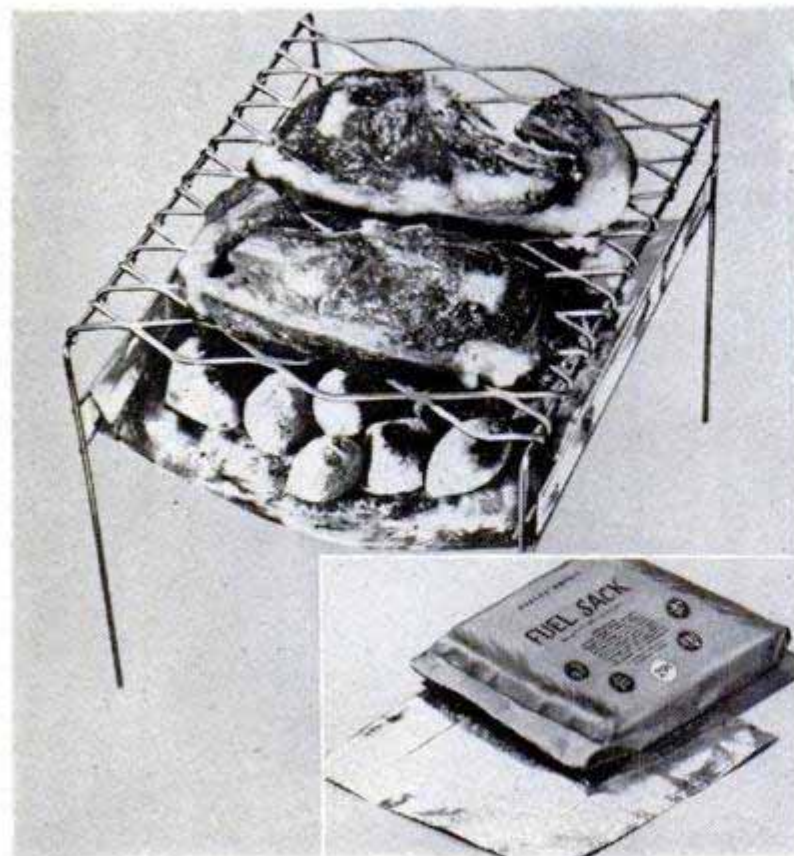
With frontal areas reduced to an absolute minimum, three sleek German racing cars have their engines in the rear. The engines

used are from the Porsche sports car, which also is a rear-engine design. The cars will compete in the West German circuit.

High-Speed Motion-Picture Camera Takes 3,500,000 Shots Per Second

One of the fastest cameras ever built has been developed at the University of California for photographing explosive phenomena at speeds up to 3,500,000 frames per second. That's about 150,000 times as fast as the usual motion-picture-camera speed.

Two stationary film strips are used. The element that makes the high-speed exposures possible is a small two-faced mirror that rotates at 10,000 revolutions per second. The image is relayed to the film strips through a series of lenses.



Fuel Sack for Small Grill Holds Charcoal and Kindling

You don't even have to soil your hands when you broil steaks on a miniature charcoal grill. An open metal frame supports a heavy aluminum-foil fuel pan and a wire grill on which the meat rests. Briquets and hickory kindling are enclosed in a sack which is placed on the fuel pan and merely touched with a match. Used again and again, the grill may be placed on the lawn or in a living-room fireplace for indoor use.

Sources of available products described in this issue are listed on pages 12, 14 and 16. Sources of further information on other articles are given in the WHERE-TO-FIND-IT LIST, which is available to readers without charge from Bureau of Information, Popular Mechanics, 200 E. Ontario St., Chicago 11

Radio Television Electronics

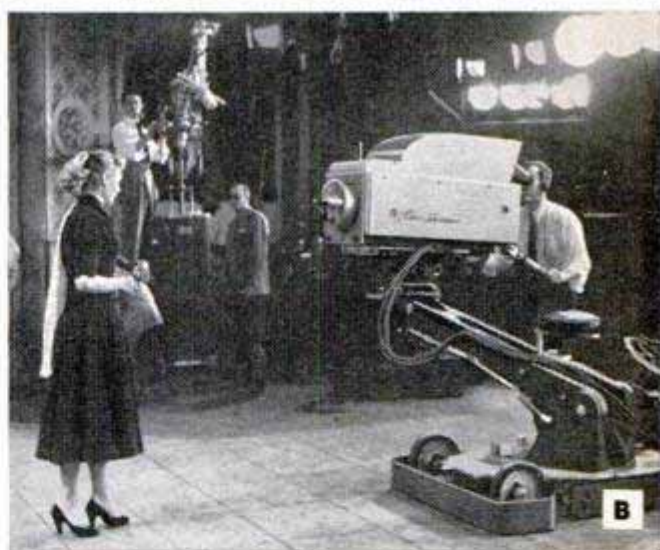
COLOR TELEVISION FIELD TESTS

COMPATIBLE color television pictures are broadcast through the air from the National Broadcasting Company's TV transmitter atop the Empire State Building in New York City for reception in the RCA Research Center at Princeton, N. J. This transmitter, regularly used by WNBC-Channel 4, operates on experimental license KE2XJV in these recent tests.

The signal, as specified for field testing, carries three streams of information—black-and-white information, color information and audio information—all of which are transmitted simultaneously on one channel 6 mc. in width. Reproduced on the screen of the color-TV receiver in Princeton, photo A, the pictures are in full color, while pictures from the same transmission appear in black and white upon the screens of standard television receivers. One of the NBC stars appears before the RCA color-TV camera in photo B.

A view of the new RCA experimental tri-color television-camera tube appears in photo C. This tube which, in the future, may do the work of the three camera tubes now needed in color-TV camera units, is held by Dr. Paul K. Weimer. The experimental single-tube camera unit, below, is smaller and has simpler circuitry than 3-tube color-TV cameras.

Photo D shows the soundproof control room in New York City.



MULTI-SCALE DIAL

BAND SET C2 AND C4

BAND SPREAD C3

HAND-WOUND PLUG-IN COILS

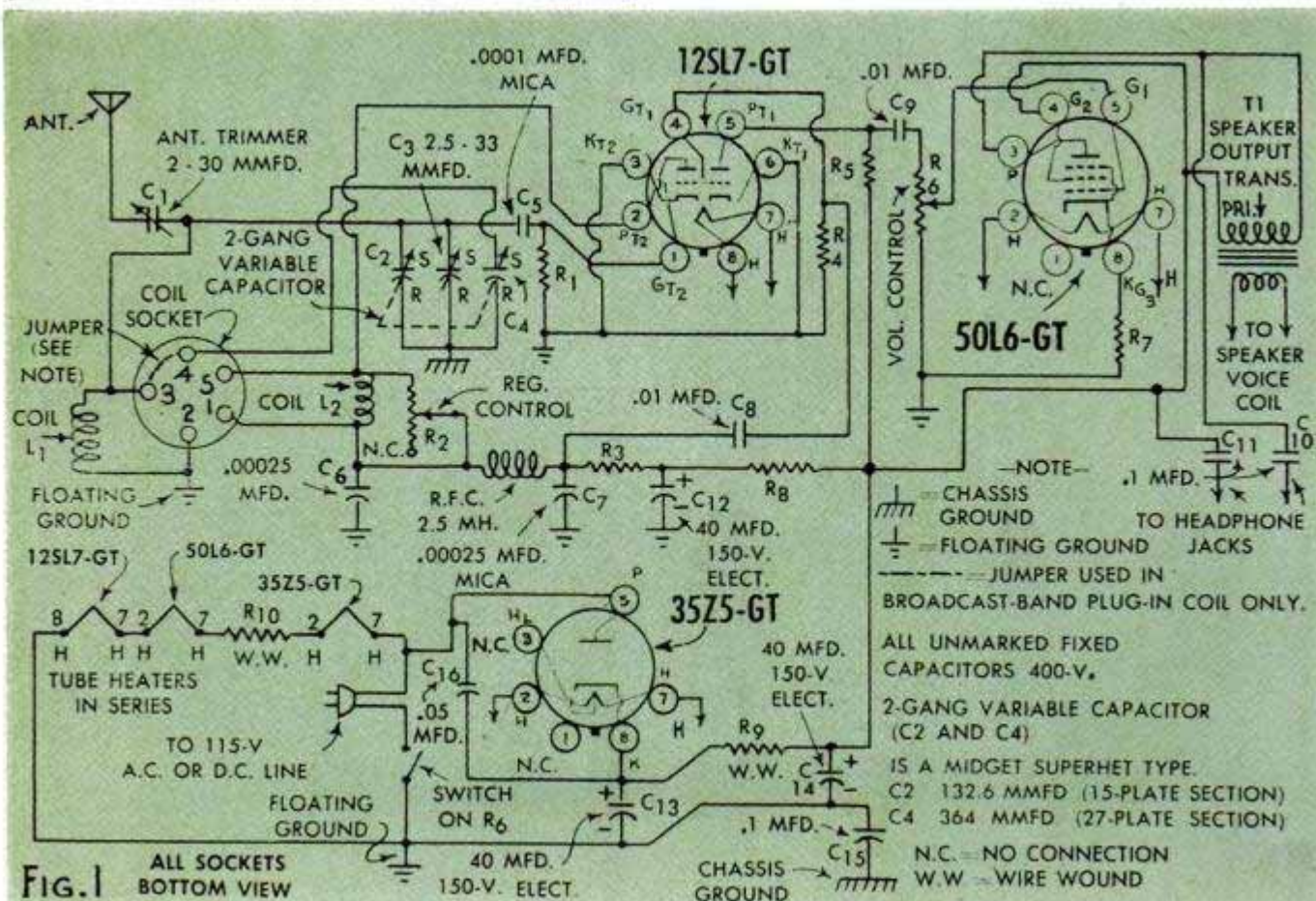
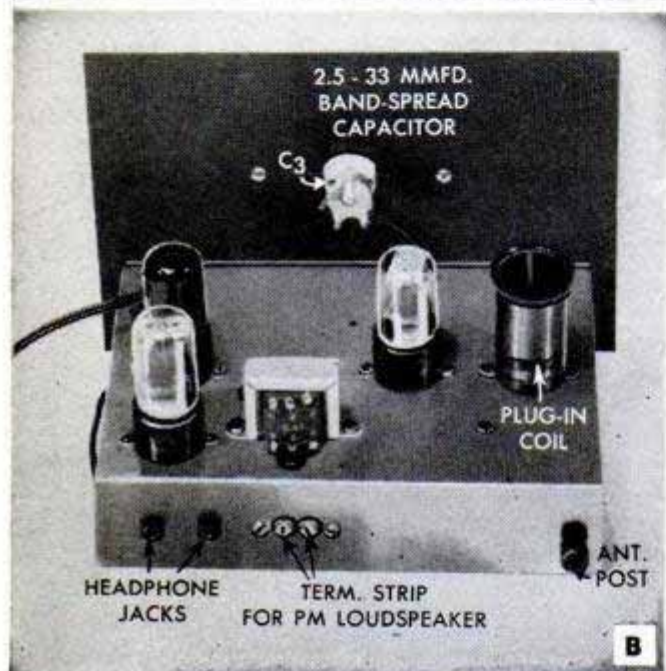
REG. CONTROL

VOLUME CONTROL AND ON-OFF SWITCH

A

It can hop oceans and bring in stations from many foreign countries if a suitable antenna is used, and if local receiving conditions are normal. Many stations on all bands will come in with sufficient volume to operate a loudspeaker, while weaker ones at extreme distances can be heard with headphones. This improved model uses standard parts available from any of the radio-parts houses in this and many

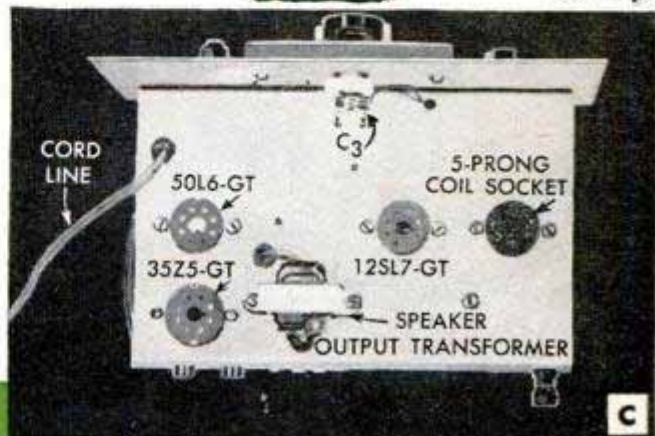
R1 1 megohm, 1/2-watt carbon
R2 5000-ohm potentiometer (Mallory U12)
R3 68,000-ohms, 1/2-watt carbon
R4 4.7 megohms, 1/2-watt carbon
R5 100,000-ohms, 1/2-watt carbon
R6 500,000-ohm potentiometer (Mallory U48)
R7 150-ohms, 1/2-watt carbon
R8 27,000 ohms, 1/2-watt carbon
R9 2000-ohms, 10-watt, wire-wound
R10 150-ohms, 10-watt, wire-wound



HAS HAND-WOUND COILS

other countries. It is designed to combine simplicity with good sensitivity and selectivity at low cost, and is an excellent performer. The new model employs three tubes including the rectifier; one of the tubes, however, consists of two tubes in a single envelope so that actually 4-tube performance is obtained. This 12SL7-GT tube is a dual triode which serves as the regenerative detector and audio amplifier. The power-output tube is the 50L6-GT, which brings the output up to suitable loudspeaker level. The 35Z5-GT tube rectifies the a.c. line voltage and converts it to d.c. for the proper operation of the amplifier tubes. Any a.c. ripple which might remain to produce hum is filtered out by the electrolytic capacitors C13 and C14, and resistor R9. When operated on a 115-volt d.c. line, check for polarity at the wall plug. If no signals are heard, merely reverse the plug in the wall outlet.

Photos A, B, C and D show various views



ALL UNMARKED FIXED RESISTORS
ARE 1/2-WATT

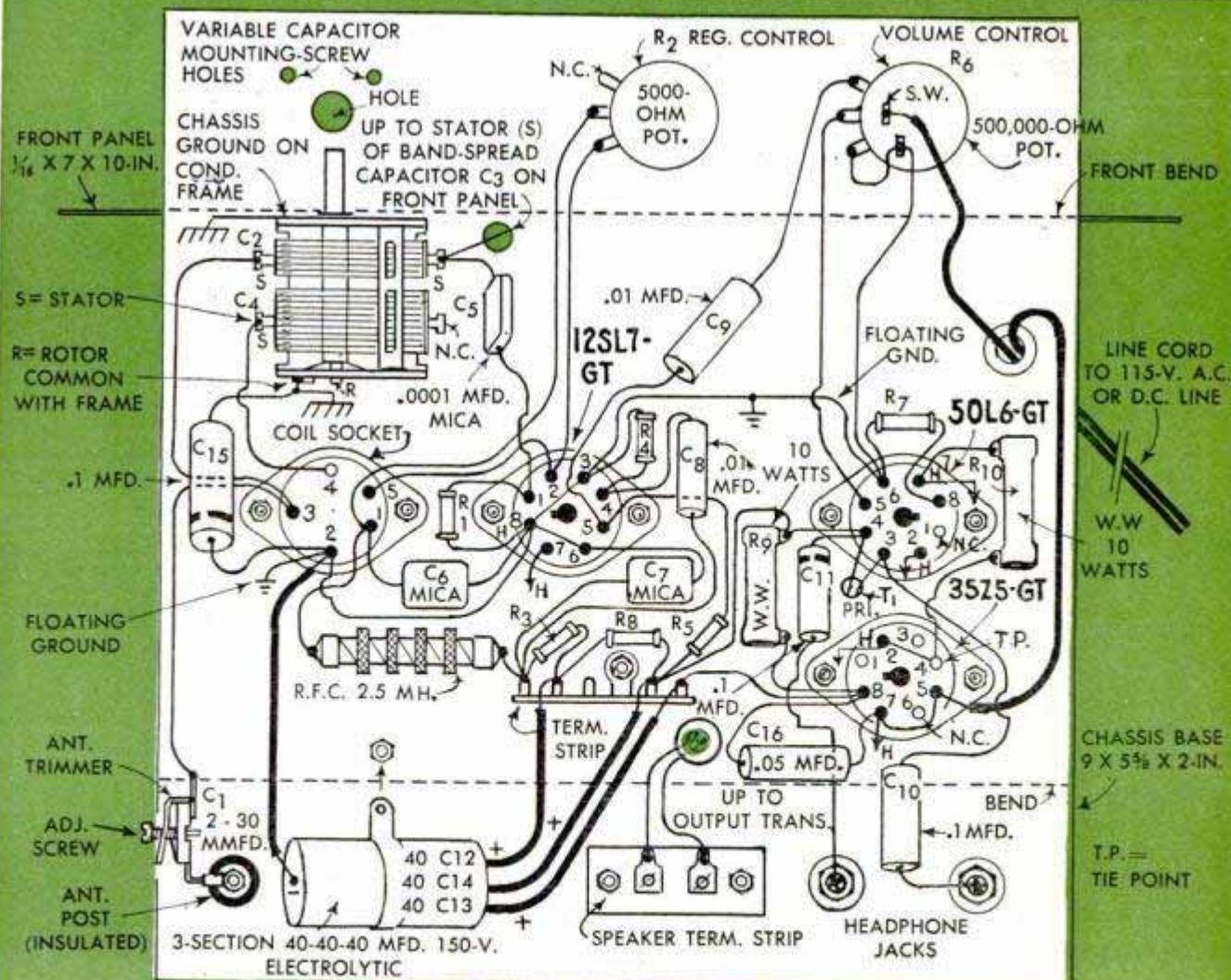
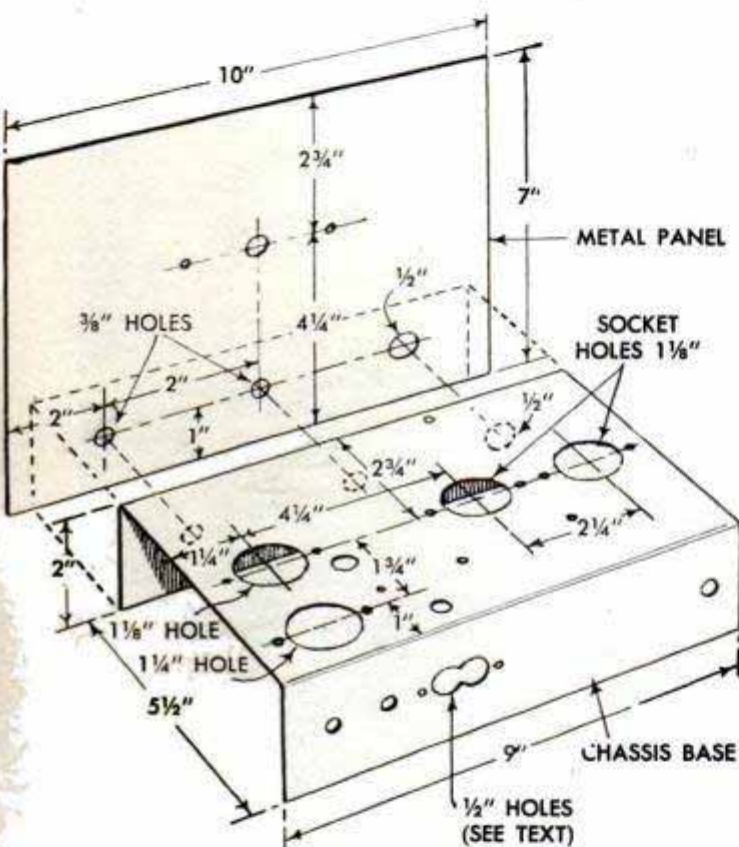
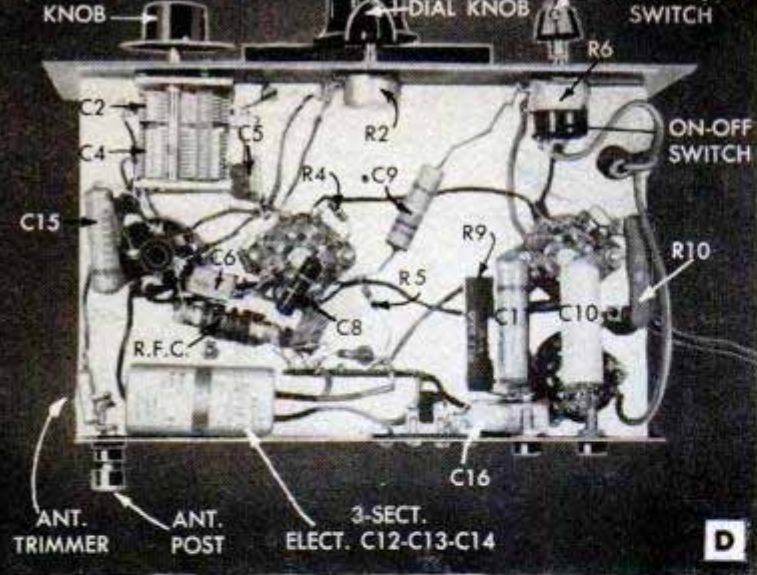


FIG. 2

BOTTOM VIEW OF CHASSIS BASE

NOTE— CAPACITORS C6 AND C7 = .00025 MFD. MICA
N.C. = NO CONNECTION. C₃ = 33 MMFD. VAR. ON FRONT PANEL



PANEL AND BASE DETAILS

FIG. 3

of the completed receiver; the schematic circuit diagram appears in Fig. 1, and a pictorial wiring diagram is given in Fig. 2. With this pictorial diagram, construction is simple enough for the beginner. An all-metal chassis base and front panel are used in this new model. The circuit and most of the component parts are different than those used in the original model; therefore do not use any of the old parts except where the specifications are identical.

The chassis base detailed in Fig. 3 is large enough so the wiring need not be crowded. It is necessary, however, that the resistor and capacitor leads connected to the 12SL7-GT tube be as short as possible. Keep the same parts arrangement as indicated in Fig. 2. The band-set condensers C2 and C4 are provided by a standard superhet type 2-gang variable. Note that the small section C2 is used for the short-wave coils; the large section C4 is used with the broadcast-band coil and C2, connected in parallel by means of a jumper wire which is in that plug-in-coil form. This increases the capacity sufficiently so the entire broadcast band can be covered with a single coil. Coil winding is not difficult; begin by drilling 4 small holes in the forms and line them up with the pins as shown in Fig. 4. Scrape the enamel away from the coil ends before soldering in the prongs.

If your front panel is enameled on both sides, scrape the enamel away from the vicinity of band-spread condenser, C3, mounting bushing, and also remove the paint or enamel from the back of the front panel where it contacts the chassis base. The rotors of C3, C2 and C4 are all grounded on the chassis base by their frame mounting screws. Be sure that the antenna post is well insulated from the chassis base.

Use an outdoor antenna 75 to 100 ft. long, especially for distant stations; an indoor

(Continued to page 224)

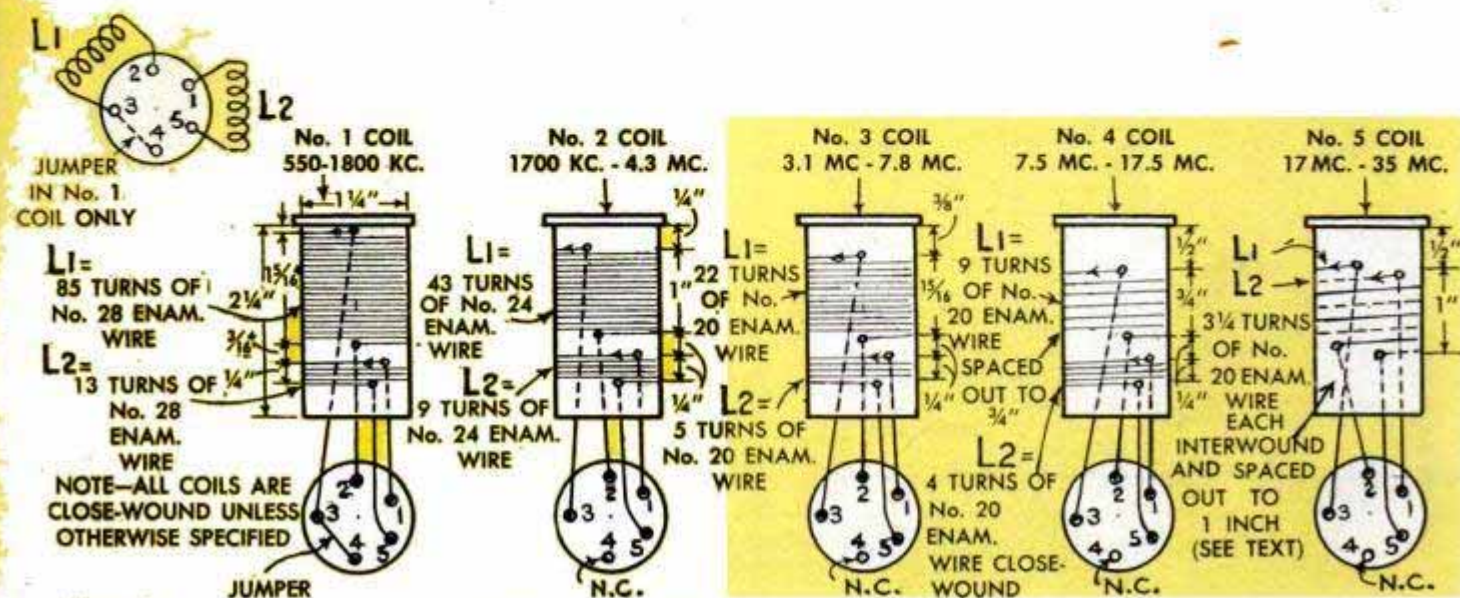


FIG. 4

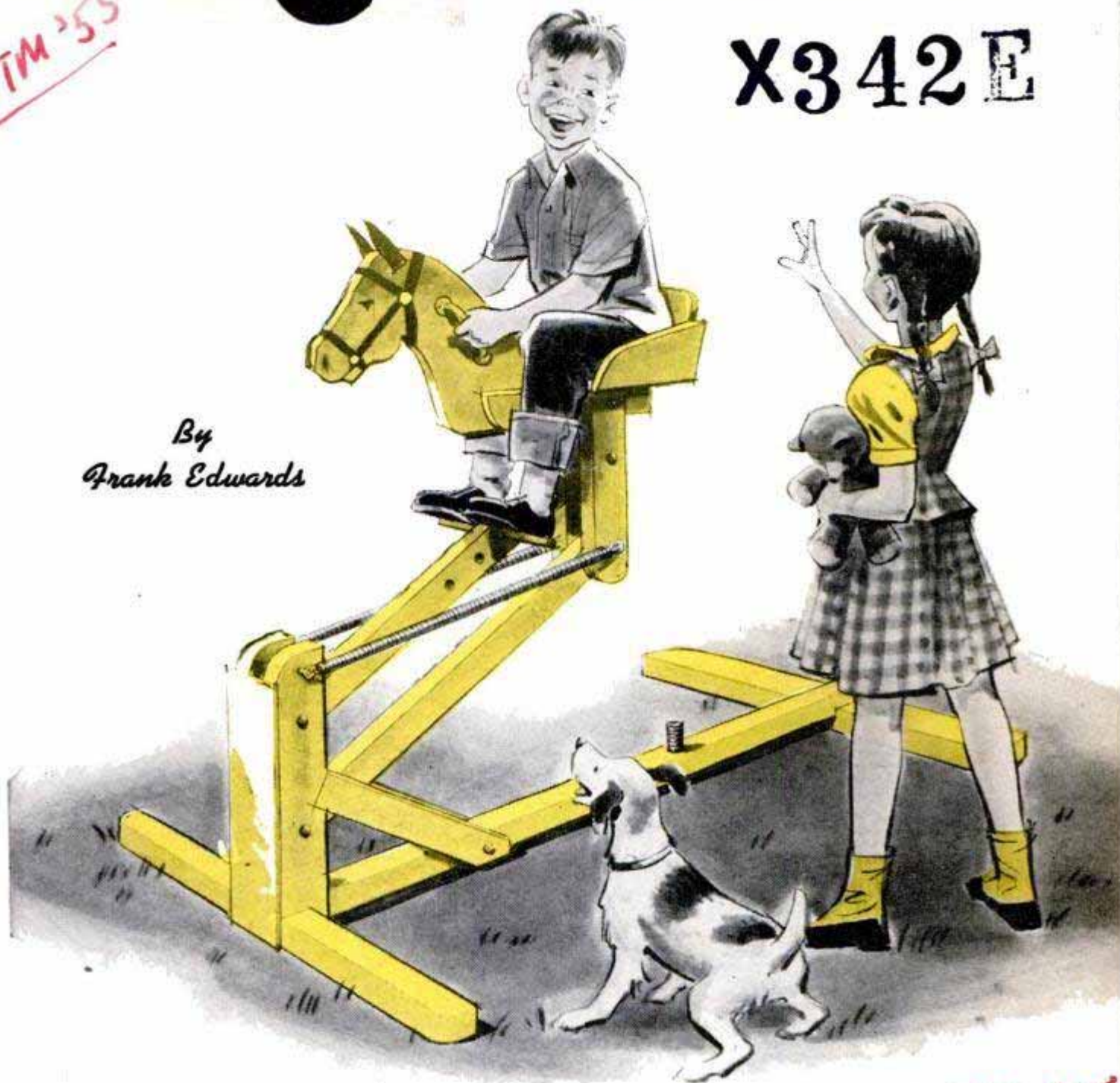
NOTE—ALL COIL TERMINALS IN PRONGS ARE SHOWN

the **CRAFTSMAN**

POPULAR
MECHANICS

X342E

By
Frank Edwards



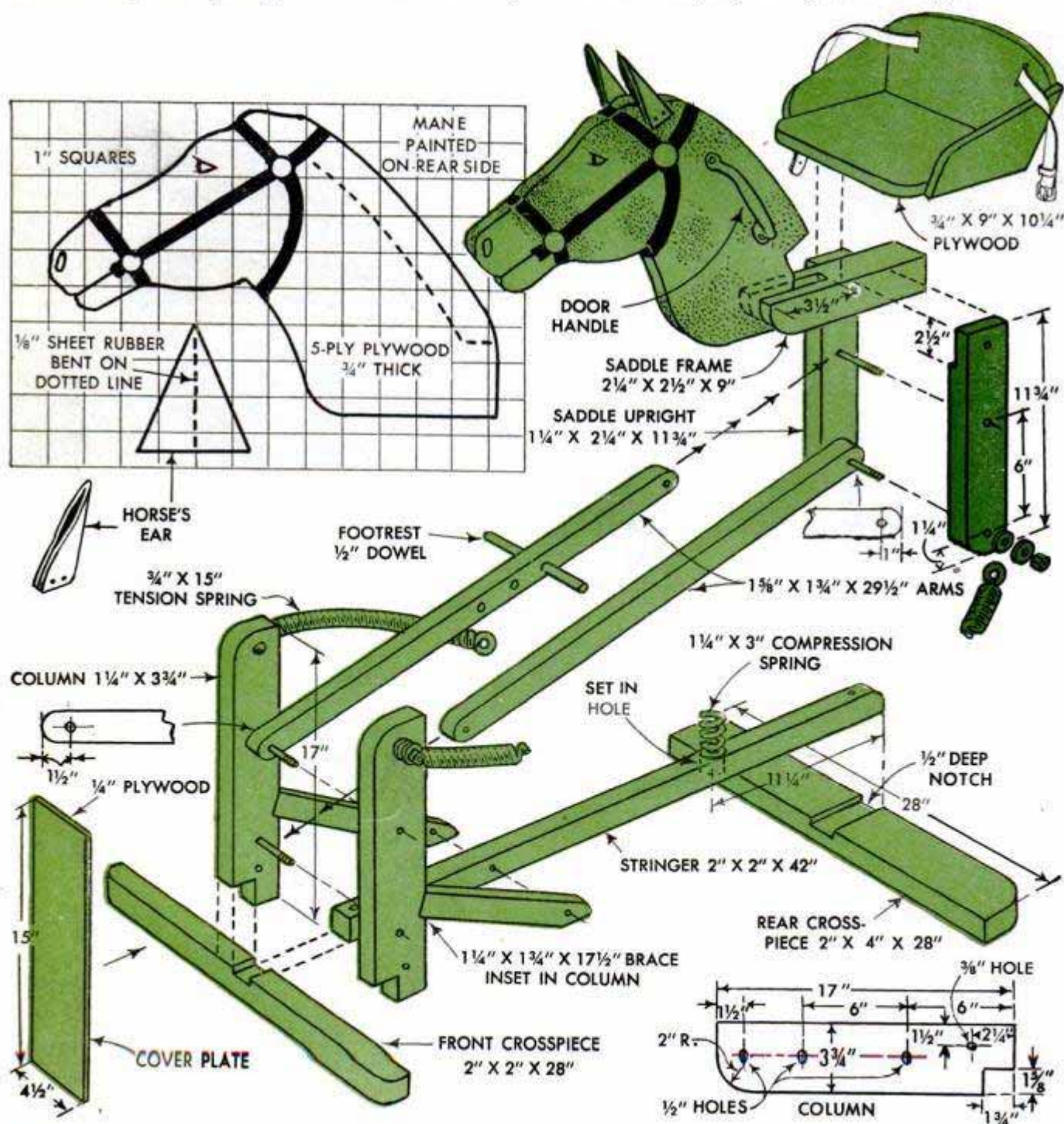
ROCKING BRONC *for TV Cowboys*

SO THAT HE can ride the range just as his favorite TV or movie cowboy does, the little "cowpoke" needs a good horse. When the chips are down and the good guys are riding hot and hard across the prairie after the bad guys, this rocking bronc will keep up with the best of them. Intended for children of two to six years, it is easily and inexpensively built. Begin construction by cutting the two crosspieces and the stringer that make up the base of the stand. These

are of pine, the crosspieces being notched and bolted to the stringer. Those parts which take most of the strain should be made of a hardwood such as oak, birch or maple. This will increase the total cost only slightly, and will result in a toy that will withstand hard usage. Thus, hardwood should be used for the columns, the arms and the uprights supporting the saddle. The saddle seat is assembled from plywood, with two slots cut in the back to take a

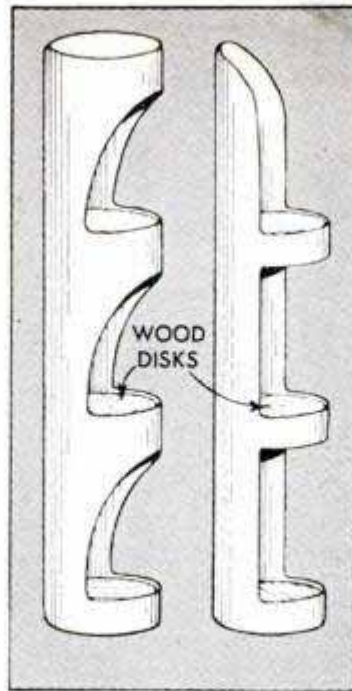
safety belt. The pattern for the horse's head is given along with the other construction details shown below. It is cut from $\frac{3}{4}$ -in. plywood and then painted gray, white or brown, with the harness, eyes and nose painted black. The mane may be painted on, or a fancier job can be done by gluing a mane made from the head of a mop to the plywood. The ears are cut from an inner tube or other sheet rubber according to the pattern and tacked in position. The hand grips fastened along both sides of the horse's neck are ordinary screen-door handles. So that adjustments can be made to suit the size of the child who is to ride the horse, several holes for the dowel footrest should be drilled at intervals in the upper arm. It is very important to see that the two tension springs are strong enough to support the weight of the child. In the original model, the springs used were No. 10,

$\frac{3}{4}$ -in.-o.d., cold-coiled steel, 15 in. long, and having a pull of about 70 lb. at a 13-in. extension. If the springs are not strong enough, the horse will not spring back from its lowered position. When the child mounts the horse, his weight will bring it down. Then, when he pulls on the handles, lifting his weight slightly from the saddle, the horse will rise in proportion to the pull he exerts. Surprisingly little pull is required in the beginning to set the horse in motion and, as the rocking motion speeds up, it becomes even easier to operate. The compression spring attached to the base stringer not only eases the shock of contact when the horse comes down, but also provides some of the thrust to keep the horse in motion. Note that during construction, to avoid any possibility of the children being injured by a splinter, all parts should be well sanded, especially at the edges. ★ ★ ★

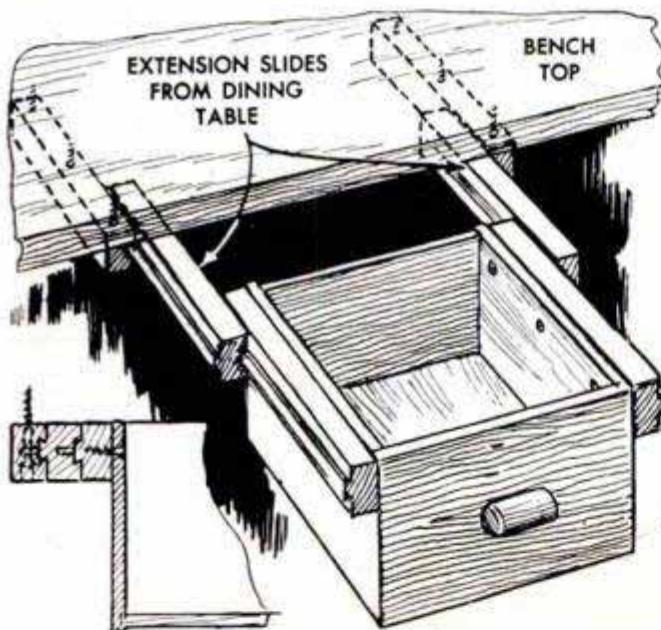


Rug Tube Converted to Knickknack Shelf

The cardboard tubes around which linoleum and rugs are wrapped for shipping can be used to make interesting knickknack shelves. A section is cut from the tube and several niches are cut in it as shown in the detail. Then wooden disks of $\frac{3}{4}$ -in. stock are cemented and tacked in place to form shelves. The entire assembly is given two coats of a sealer, such as glue size or shellac, and then painted in a color to match or contrast with the room in which it is to be used.—David P. Botelho, Falls River, Mass.



Dining-Table Slides Hang Heavy Workbench Drawers

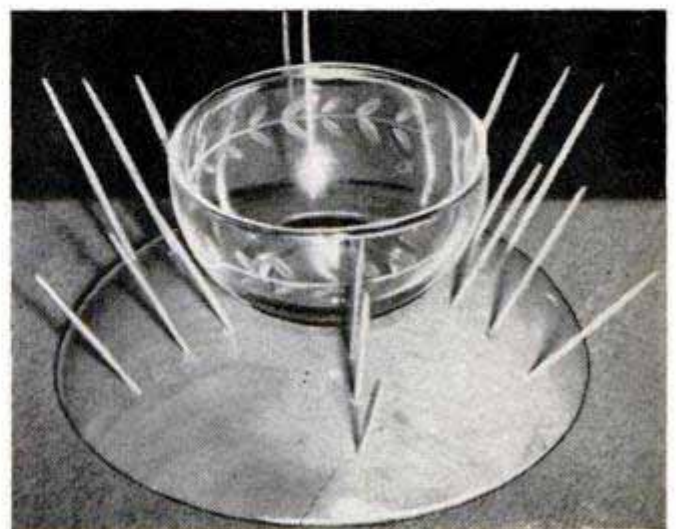


A pair of extension slides from a discarded dining-room table are ideal runners for the drawer of your workbench which is used to hold heavy tools. To install them, fasten the inner member of each slide to the upper edge of the drawer side. Locate the slide slightly above the top of the drawer to provide clearance, and drive the screws from inside the drawer. Then close the slides all the way and prop the drawer under the bench in the closed position. Fasten the outer members of the slide to the underside of the bench with screws. If the slide permits the drawer to be pulled out farther than you want, remove the outer member by sliding it all the way forward before fastening slide to the bench. The drawer will slide open easily, even when heavily loaded.—John D. Bell, Provincetown, Mass.

Server for Dinner Appetizers Made From Wooden Bowl

An unusual server for appetizers is made by inverting a wooden salad bowl, 6 in. or more in dia., and drilling it for toothpicks. Use a $\frac{1}{16}$ -in. drill, making the holes either in a regular or random pattern. Then, with a jigsaw, cut out the circular base of the bowl and sand the edges smooth. A small glass dish of the type used for serving custards is set into this cutout to hold a relish or shrimp sauce. Using colored toothpicks adds to the attractiveness of the holder.

E. L. Fisher, Milwaukee, Wis.



For best results when using new sandpaper, rub two pieces together to remove any coarse grains of sand.

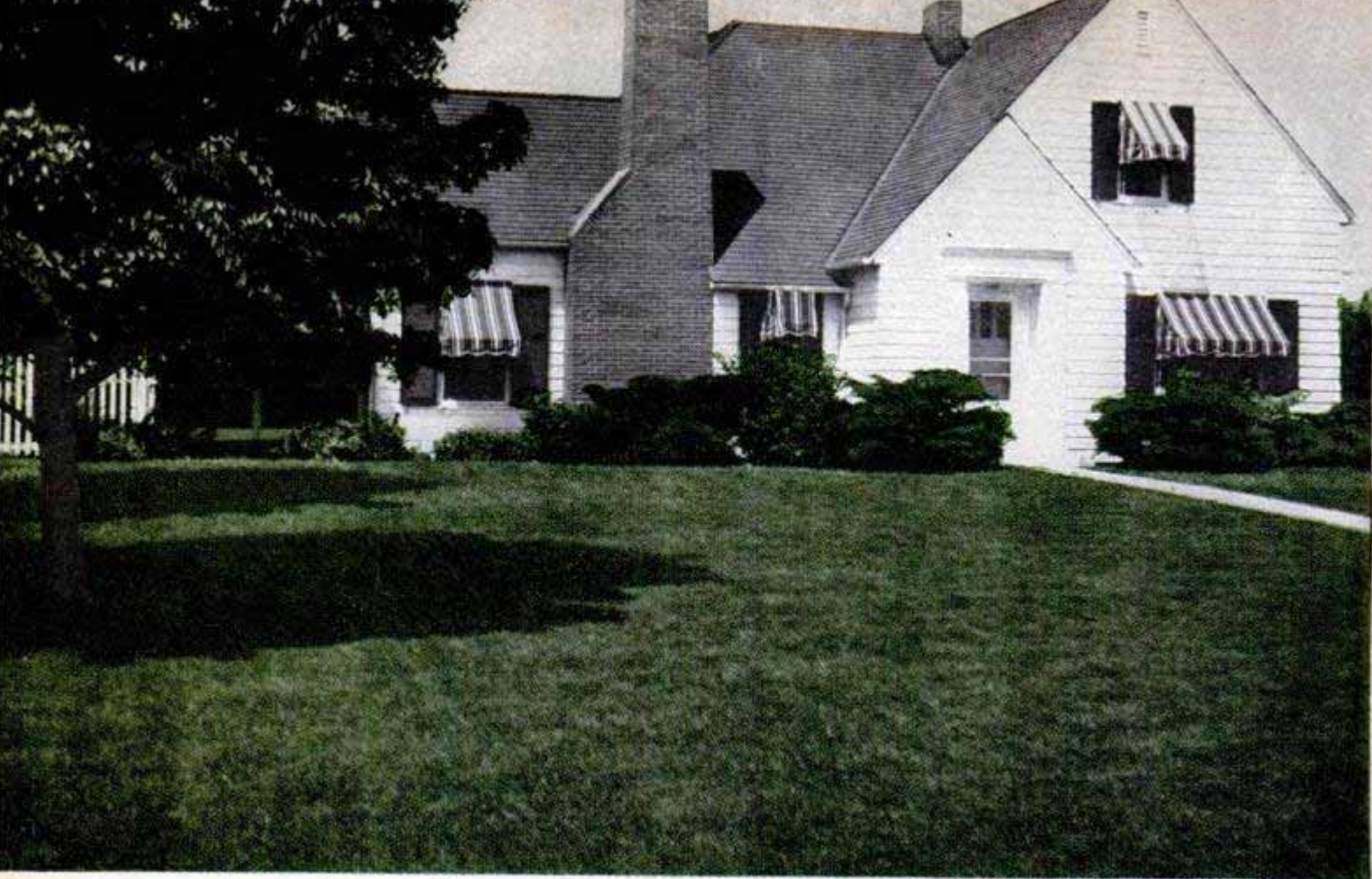


Photo courtesy O. M. Scott and Sons Co.

HARD WORK + SOIL CHEMICALS

By Clifford B. Hicks

WALK INTO YOUR favorite hardware store, nursery or even the corner grocery store, and you'll find a bewildering array of new chemical products—all designed to make your green thumb greener. Confronting you will be all manner of fertilizers, weed and crab-grass killers and soil conditioners.

Just how much help are all of these wonder chemicals? As the owner of a new home which required a few billion blades of grass around it, I've had an opportunity to discover the value of these products. Here's what I've learned: These new soil chemicals won't take the work out of building a turf. But they can give you a greener, healthier lawn if you handle them properly. For advice I went to people who know lawn products from the roots up—old-time seed experts and young research men. The direct results of their fine advice were a lame back and a good, green turf.

First of all, they said, choose the right time of year to establish your lawn. Late summer or early fall is ideal. The seed has time to germinate and establish a root system before the first freeze, and the following spring the young grass will have the benefit of long rains before the hot, mid-

summer period. Early spring is the next best season—the earlier the better. In California and the southern states spring is even better than fall, as different species of grass are used. If you establish your lawn in the spring, start as soon as the ground is dry enough to work. Successful lawns have been sown right up to midsummer, but such late plantings are a gamble.

The experts advise a little planning before you even pick up your spading fork. First, consider your topsoil. At least 3 in. of good topsoil are needed. You can make a simple test to determine the type of soil you have. Wet a small sample and roll it into a ball with as little pressure as possible. Dry the ball for several days, then drop it from a height of 3 ft. to a concrete surface. If it shatters, it contains too much sand. If it remains intact, it contains too much clay. If it crumbles readily but doesn't shatter, you have a soil of good consistency.

Poor soils are improved by mixing soil of the opposite type with them. A sandy soil can be helped by adding 15 to 20 percent by volume of fine clay. Clay soils require from 35 to 50 percent by volume of coarse sand to increase their moisture-holding capacities. The new soil condition-

ers do an excellent job of "stabilizing" clay soils so they won't crust, and are especially useful for the treatment of slopes to prevent the washing away of new seedings.

Excessively acid soil can ruin a new lawn, so the next step is to determine whether your topsoil needs lime. In some states samples of the soil can be sent to the state agricultural college for analysis. Some seed and fertilizer manufacturers provide a testing service, and inexpensive home-testing kits are also available. In general, if you live in the eastern section of the country, you probably should add lime to the topsoil, applying 25 to 75 lb. per 1000 sq. ft., depending on the acidity of the soil. In the West, the soil may need an application of gypsum because of alkalinity.

The next step is to determine how you'll feed your lawn. Stable manure, sewage sludge and so-called mushroom soil are all excellent sources of humus. They will improve soil texture and fertility if applied at the rate of 1 or 2 cu. yd. per 1000 sq. ft. The most convenient way to feed your lawn is with the newer "balanced" fertilizers. They contain the three major elements—nitrogen, phosphorus and potassium. Some of



Above, twine between stakes measures grade. Below, rolling of fluffy soil will prevent uneven settling



Below, board fastened to rake forms a straightedge for final leveling of the new lawn prior to seeding

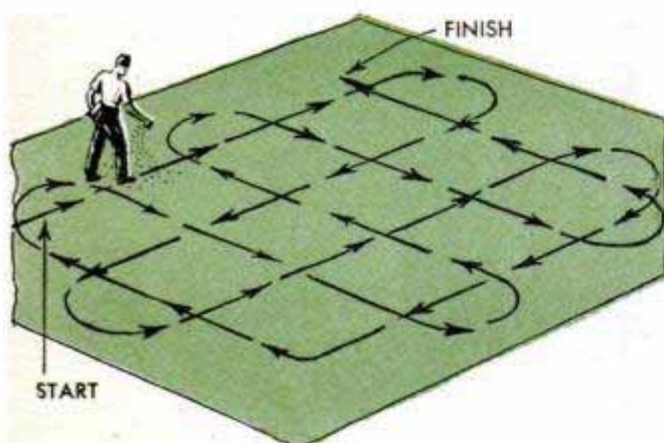


= FINE LAWN



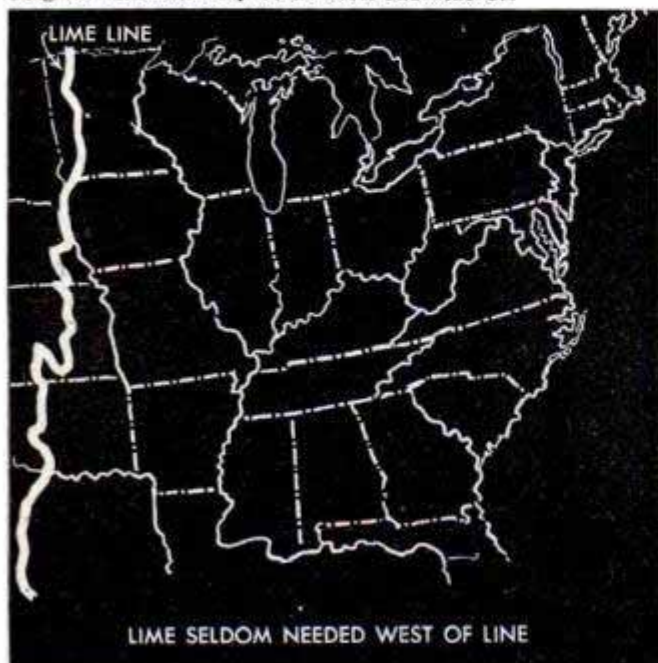


Above, grass seed is most evenly sown with spreader. Below, pattern to follow when sowing seed by hand



Below, lime is seldom needed west of "lime line." Many areas in the East need lime, while others do not

Diagram below courtesy O. M. Scott and Sons Co.



them also contain minute quantities of the "trace" elements needed for good growth. These trace elements are now available in a form called "fritted trace elements," which usually should be used in addition to fertilizer, as it is not a complete food.

An analysis showing the percentage of each element is printed on each bag of fertilizer. Thus, a 5:10:5 fertilizer has 5 percent nitrogen, 10 percent phosphorus and 5 percent potash. Other ratios, such as 6:10:4, are available and all of them will feed your lawn well. Instructions on the bag tell you how much to use, but a good rule of thumb is 20 to 40 lb. per 1000 sq. ft.

The choice of seed depends on the soil, rainfall, slope, shade and personal preference. If in doubt, describe your lawn to your seed dealer and take his advice. Consider the size of the seeds while estimating the cost. The most desirable perennial grasses have small seeds compared to cheaper and less desirable grasses. A poor seed blend may contain one million seeds to the pound, while a good seed may count out at three million. Each seed, potentially, will establish one grass plant. Therefore three times as much of the cheaper seed is needed on the same area. In general, you'll need 4 to 6 lb. of seed per 1000 sq. ft. You'll also need a little extra seed to fill in the bare spots later. Both seed and fertilizer can be spread most evenly with a mechanical spreader, which some stores rent at a low fee.

Now, you're ready to put your back to work. Most contractors "rough grade" a lot after the home is built. Usually it's mighty rough. Big clods on the surface must be broken up, the grade established and the topsoil spread. The lawn should slope away from the house to prevent water from accumulating around the foundation. If you want a simple slope, set a few stakes along the foundation with corresponding stakes along the bottom of the slope. Now run twine between the stakes, keeping it 4 in. off the ground to permit you to work under it. If you want a roll or "crown" to the lawn, set rows of stakes 25 to 30 ft. apart. Connect all the stakes in each row with twine, then cross-tie the rows. By viewing the network of cords from a distance and then adjusting them, you can put the crown you desire on the lawn.

A slope of 1 ft. in 100 ft. is necessary for good drainage. A good stand of grass can be maintained on slopes up to 25 percent (a fall of 1 ft. in 4 ft.). Steeper slopes are difficult to maintain. If you have a hillside problem, consider the use of terraces.

With the lawn graded, you can apply the lime and fertilizer. They should be mixed 4 in. into the soil, and so should be spread before you work up to the final seed-

bed. If left unmixed on top, the fertilizer may encourage shallow root growth. Working up a good seedbed is just plain old-fashioned work. Clods must be broken up so the final bed is nothing but fine particles of soil. It may help to sprinkle the soil occasionally and then let it dry for an hour or so to get it to the right working consistency. If the soil is "fluffy" (for example, if it has been turned with a rotary tiller) you may have to roll it periodically as you work.

Just before seeding, establish a perfect grade, eliminating shallow pockets and hills by using a 4 or 5-ft. board as a leveler. Work the board slowly across the lawn without pressure, first in one direction and then at right angles.

If you sow by hand, divide the seed for a given area into two piles. Start sowing at one end of the lawn, walk to the other end, and return covering another swath. Judge your seed depletion as you work. One pile should cover the entire lawn. Sow the second pile in the same fashion as the first, working at right angles to your previous path. Finally, roll the seed lightly to bring it into firm contact with the soil.

Now you can relax and watch the grass pop up in a green fuzz. Once the seed is in the ground, you need only keep the surface moist during germination. The best method is to sprinkle lightly and frequently. If you see a rainstorm bearing down across the horizon, rush out and sprinkle your lawn immediately. Your neighbors may think you're crazy, but a light sprinkling at this time will prevent a downpour from washing out the newly seeded areas.

As soon as the grass reaches an inch in height, you may reduce the surface sprinklings, but soak the lawn at regular intervals. Heavy waterings will soak deep into the soil and encourage heavy root growth. In watering a well-established lawn, re-

member that during six warm rainless days, your lawn will lose the equivalent of $\frac{1}{2}$ in. of rain. Several hours of good sprinklings are required to replace this loss.

Let the grass grow to a height of 2 in. before its first mowing. Leave the clippings to provide a mulch to shade the young plants. Clippings also help somewhat in feeding your lawn. The lawn should be cut often enough so that the clippings are short, about $\frac{1}{2}$ in. long. Set your mower to cut at $1\frac{1}{2}$ in. until the lawn is well established. Then vary the height according to the season, 1 in. during cool weather and $1\frac{1}{2}$ to 2 in. during the heat of the summer. Shaded lawns need extra high growth, while bent-grass lawns should be clipped to 1 in.

The single most important factor in keeping a lawn healthy is regular feeding. Give your lawn a good meal in the spring—10 to 30 lb. of balanced plant food per 1000 sq. ft. The same treatment the following fall will insure fine growth and color. Never feed a lawn when the grass is wet, as the fertilizer will stick to the blades and burn them. Feed when the grass is dry, ruffle the blades with a hand rake to shake off the fertilizer and then water immediately.

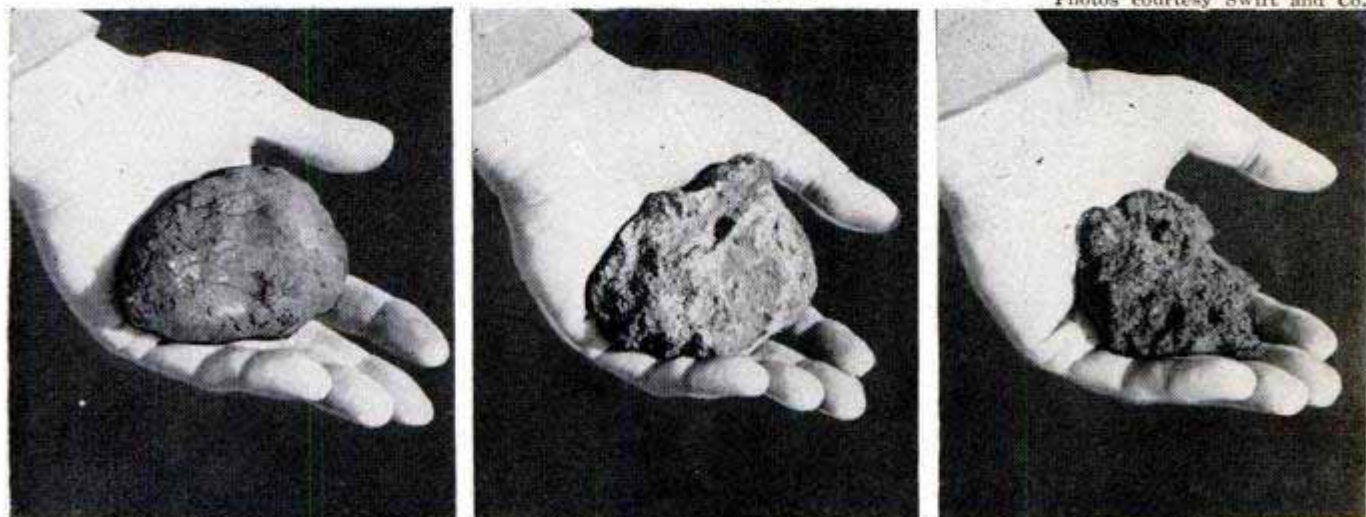
If you establish your lawn in the fall, don't weed-kill until the next year. Weed-killing chemicals should be applied in late spring and early summer. Weed killers are effective only when they are absorbed through the leaves. For that reason, never apply a weed killer when a rain is expected within eight hours. Give the chemicals time to work. Effective crab-grass-killing chemicals also are now available.

And whenever you feed your lawn, apply twice as much fertilizer in the vicinity of trees. Frequently the cause of poor lawn growth around large trees is *not* the shade but is the tree's huge root system which is stealing all nutrients from the soil.

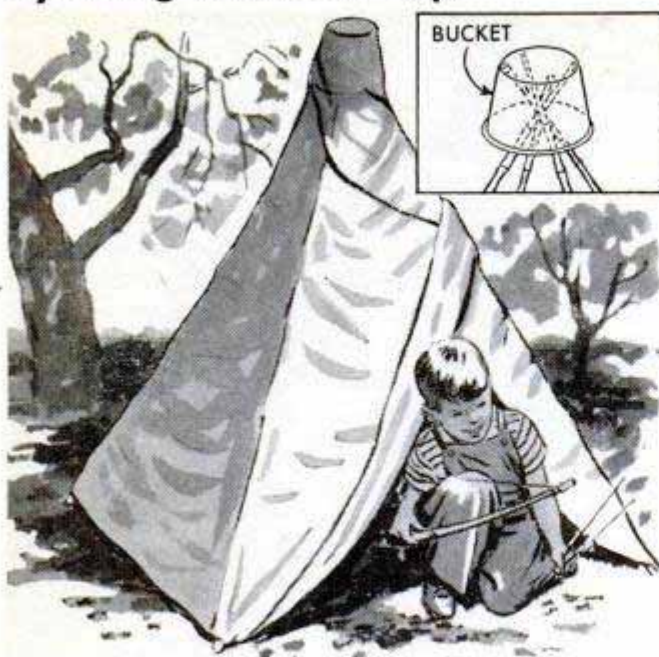
★ ★ ★

Don't work soil when it's too wet. Below, left, if it molds into tight mass when squeezed, it's too wet. Center, if too hard or powdery to mold, it's too dry. Right, if it molds in the hand, yet crumbles easily when tapped, it's just right for working. Test does not apply to soil with too much clay or sand content

Photos courtesy Swift and Co.



Child's Tent Erected Quickly By Using Bucket at Top



A child's play tent can be improvised quickly by putting a small bucket over the tops of four bamboo poles of equal length, and spreading the poles at the base to form a square. Then a blanket or tarpaulin is wrapped around the poles and pinned in place. The operation requires only a few minutes, and is so simple that the children can be taught to do it themselves with little difficulty.

Curtain-Rod Joint Taped To Secure Adjustment



When hanging curtains, fitting curtain rods in place over their hooks usually can be done in a matter of seconds—provided the telescoping sections have not slipped out of adjustment during handling.

One way of preventing this is to wrap a turn or two of adhesive or cellulose tape around the joint in the manner indicated in the photograph.

Ken Murray, Colon, Mich.

Asbestos Cement on Gas Line Stops Vapor Locking

Vapor locking in automobiles, caused by too much heat near the gas lines or fuel pump, can be corrected on some cars by coating the areas likely to overheat with asbestos furnace cement. Sections of the gas line passing near the manifold, exhaust

pipe and muffler should be the first areas checked. The cement can be held in place around the fuel pump or gas lines with narrow medical gauze. Should it ever be necessary to remove it, the cement can be cracked and peeled away easily.

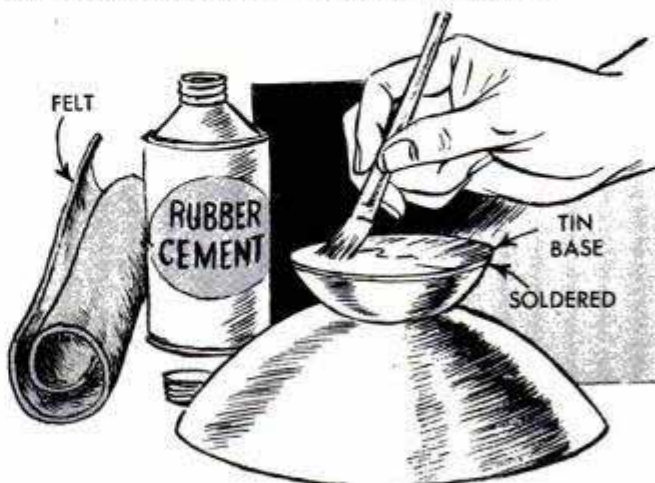
Sawhorse "Wings" Hold Plywood

Two detachable "wings" fitted across a sawhorse are handy supports when sawing plywood panels and wide boards. Each wing consists of two sections of 2 x 4 hinged with a strip of sheet metal 2 in. wide. The spacing between the two pieces of 2 x 4 should be exactly the width of the crossbar of the sawhorse. When a panel is placed on the wings, its weight is sufficient to clamp them firmly on the horse. However, to be sure that the wings won't slip, brads can be driven into the 2 x 4s at the point where they come in contact with the horse, and the projecting heads of the brads sharpened with a file.



Disk Over Brass Bowl Base Permits Attaching of Felt

The felt pads on the bases of brass bowls with hollow bottoms tear loose frequently, causing the bowl to mark the surface on which it is standing. To give the felt a firm gripping surface, solder a sheet-metal disk cut from a tin can over the bottom of the base, and cement the felt over it. Apply a thin coat of rubber cement to the tin, and another to the felt. The edges of the felt are trimmed with a razor blade after it has dried for a few minutes.



☞ To remove varnish from metal, dip the article in a mixture containing equal parts of alcohol and ammonia.

ORNAMENTAL LAMPPOST

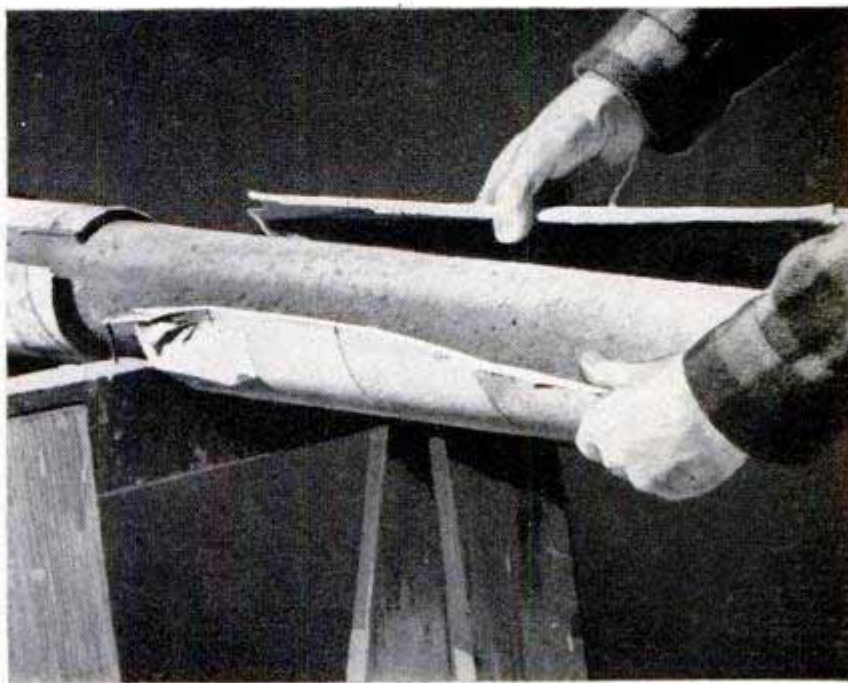
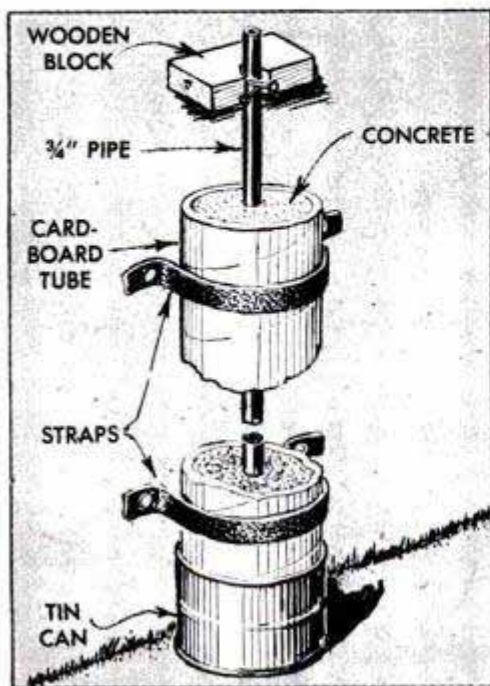
cast in cardboard tube

By Oliver C. Grant

A YARD LAMP of the lantern type is one of those finishing details that adds its own decorative touch to old and new homes alike. The lamppost, usually the main problem in the construction of the lamp, can be cast in concrete, using as a form a heavy cardboard tube of the type used when shipping rugs or linoleum. The inside diameter of such tubes averages about 4 in., which makes a form of just the right size for casting the post. Coat the inside of the tube with shellac, using a cloth swab attached to a stick. Then, cut a $\frac{3}{4}$ -in. hole in the bottom of a tin can—a 1-lb. coffee can is about the right size—and press the can over one end of the form. Now insert a length of $\frac{1}{2}$ -in. pipe in the form, passing the end through the hole in the can, and screw on an elbow and a 4-in. nipple which will be used to feed in the wiring. Cut the other end of the pipe about 6 in. longer than the form. Then stand the whole thing vertically against the wall of the garage or a straight post and anchor it in place as in the detail below, using sheet-metal straps. Be sure that the form is straight and that it stands perpendicular; also that the pipe is held in the center of the tube with a wooden block. Mix cement, 2 parts, sand, 2 parts, and fine screened gravel, 3 parts. Pour the mixture slowly into the form. After the mixture sets, remove the form from the anchors and strip off the cardboard tube. Keep the casting damp for several days.



Above, concrete lamppost is both decorative and permanent. Below, stripping cardboard form from casting



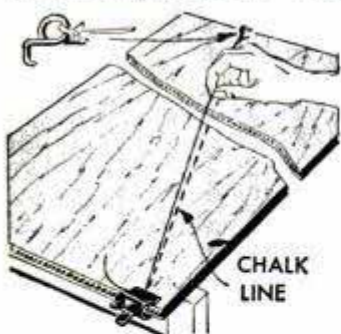
Game Bags Convert Leather Jacket Into Winter Hunting Coat



A suede leather jacket can be converted into a winter hunting coat by the addition of game bags sewed to the front of it. These bags may be purchased at most sport stores with a leather shoulder strap attached. Carefully cut off the shoulder strap and secure the bags to the jacket with a row of stitching at the base of the flap. This will allow the bag to swing away from the coat at the bottom.

Homer E. Lee, Bedford, Ind.

Chalk Line to Mark Plywood Held by Hook and Clamp



One man can mark plywood sheets with a chalk line by tying a wire hook to one end of the line and using a large paper clamp to hold the other end in place. Hook the line in position, draw it tight along the proposed chalk line, and fasten the free end with the paper clamp. Then snap the line to make the mark. In this way, large sheets can be marked easily.

Cutting a Piece of Timber

One way to make a straight saw cut through a piece of timber is to mark squared guide lines on all four sides so they connect at the corners, and then make shallow cuts on two opposite sides. Then,

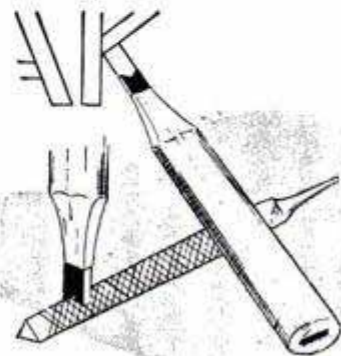
turning the work so the cuts are on the sides, use them as guide lines while making the cut. Another way is to nail wooden cleats vertically to sides of the timber along the marked lines, taking care to allow enough clearance between them for free movement of the saw. If desired, the cleats may be nailed so the top ends extend a couple of inches above the edge of the timber to facilitate starting the cut.

Andrew Vena, Philadelphia, Pa.

Double-Pointed Carpenter's Pencil For Lettering Price Cards

A carpenter's pencil with a wide, flat lead, can be used to make neat, unusual price cards for store merchandise, or to do double-line lettering of any kind.

To prepare it for this double-line effect, the pencil is first sharpened to a chisel edge, and then ground on a three-cornered file to a double point, as shown in the detail.



Hunter's Small First-Aid Items Carried in Drinking Cup

Small first-aid items taken on a hunting trip can be carried easily when packed inside a collapsible drinking cup. Carried in this manner, they will be kept clean and dry. Items to be included should be adhesive bandages, a small tube of eye ointment and a bottle of antiseptic.

H. Leeper, Canton, Ohio.



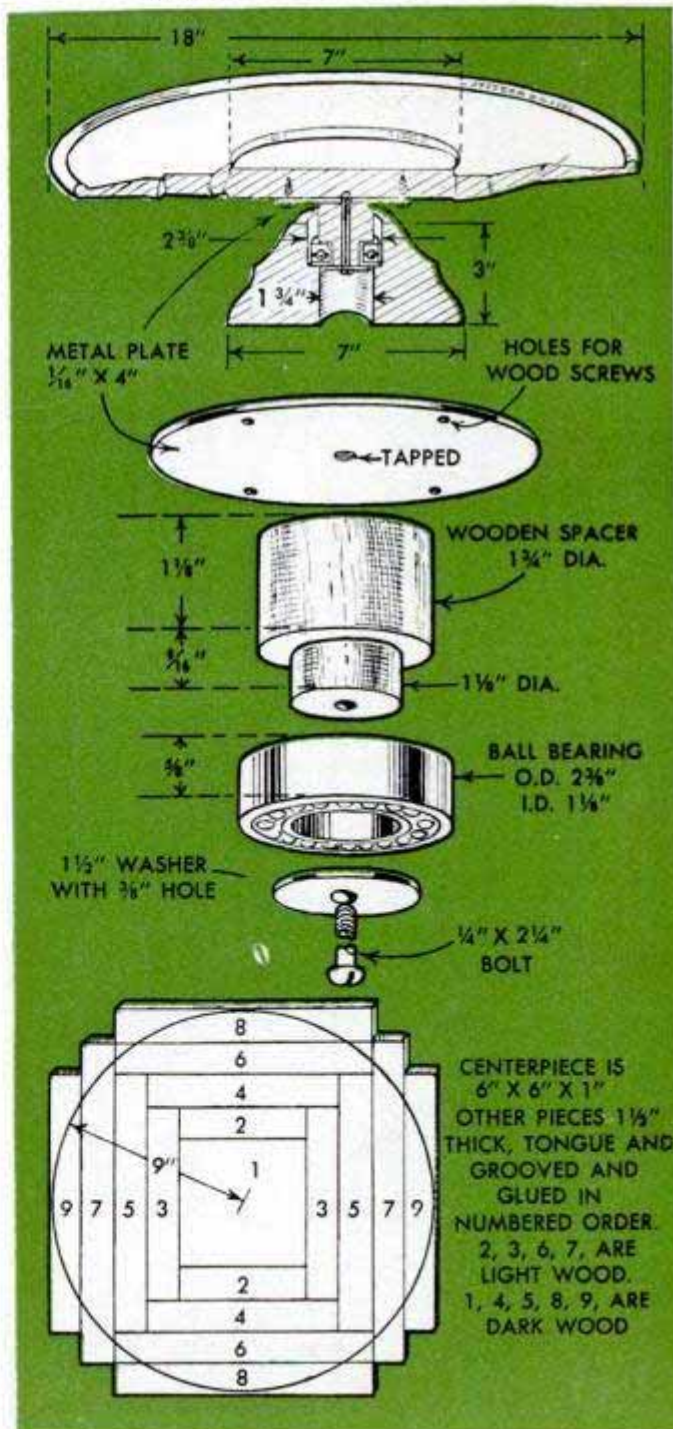
Ⓐ doorbell can be heard better throughout the house if the bell is placed in contact with a part of the heating system.

LAZY SUSAN IN MARQUETRY

A Project for Your Wood-Turning Lathe

By
Doris Fry Wiley

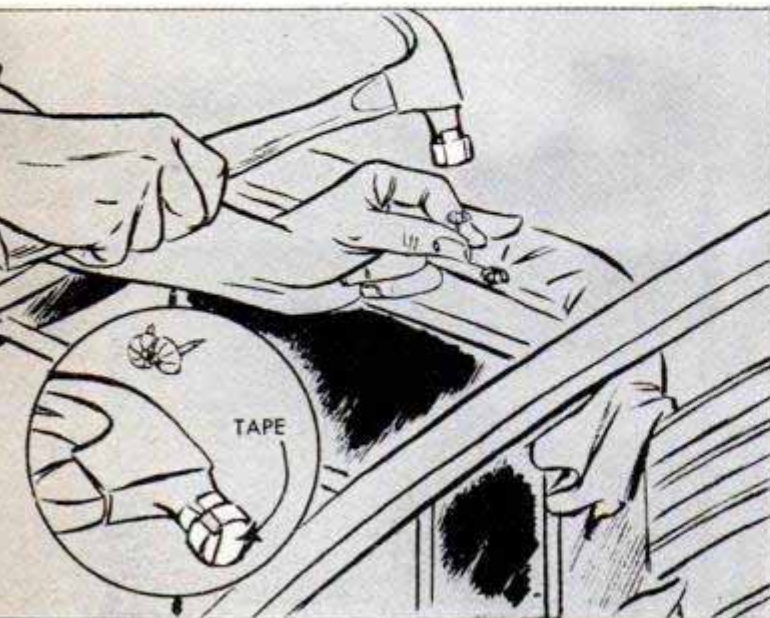
FOR THAT EXTRA touch of smartness when you entertain, set this Lazy Susan in the center of your dining-room table. It is built up of walnut, maple and mahogany in a marquetry design, and rotates freely on a ball bearing concealed in its base. Following the pattern shown, tongue-and-grooved pieces of both light and dark wood are assembled alternately around a dark-wood centerpiece to make the circular tray. The edges are planed and squared after each new piece is glued in place, and the entire assembly is clamped and allowed to dry for 12 hours. After this, screw the stock to a lathe faceplate and turn the tray to shape. The diameter of the finished tray should be 18 in., and the outer rim should be turned to a $\frac{1}{4}$ -in. thickness. In most cases, the tray will have to be turned on the outboard end of the lathe, using a floor-type tool rest. A $\frac{1}{8}$ -in. depression, 7 in. in diameter, is turned in the center of the tray to hold a saucedish. Sand and finish the tray while it is in the lathe. Apply a mixture of boiled linseed oil, 1 part, and turpentine, 2 or 3 parts, and rub vigorously into the tray as it is spinning. Then, to bring out the real beauty of the wood, give it several coats of pure linseed oil, polishing each coat with a soft cloth while the work spins. The base is made from 3-in. solid walnut, 8 x 8 in. sq., turned to the shape shown. The base is drilled for the bearing, a turned wooden spacer and a washer. The assembly of these parts is shown in the detail. The entire unit is held together by a $\frac{1}{4}$ x $2\frac{1}{4}$ -in. bolt turned into a tapped metal disk, which is fastened with four wood screws to the underside of the tray. Auto-repair shops many times can supply you with a defective bearing which is satisfactory for use in the tray. And the metal disk which fastens to the bottom of the tray can be made from the cover plate of an electrical outlet box. To complete your Lazy Susan, cut a piece of felt to fit the bottom of the base and glue in place.



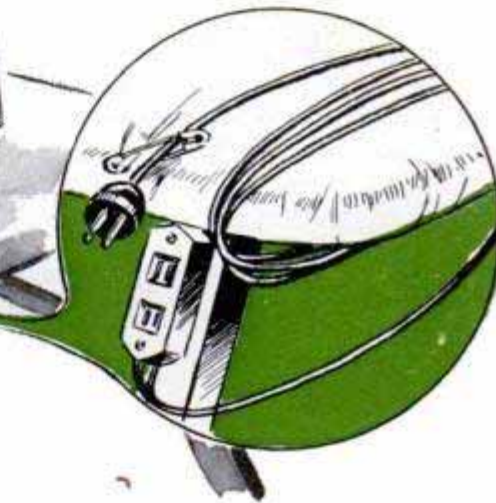
Solving Home Problems



WHEN DRIVING FURNITURE NAILS, cross two strips of adhesive tape over the head of the hammer. Tape protects decorative nailhead by cushioning hammer



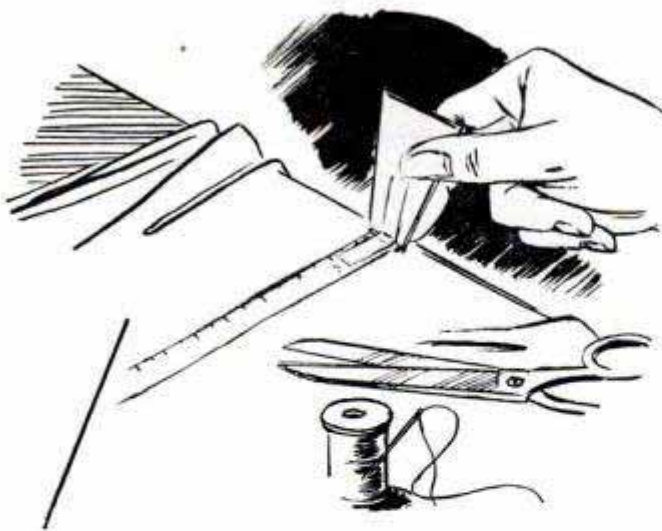
REMOVING DECALS is easy if they are painted with several coats of hot vinegar. Allow vinegar to soak into decal, then simply wash decal from the surface



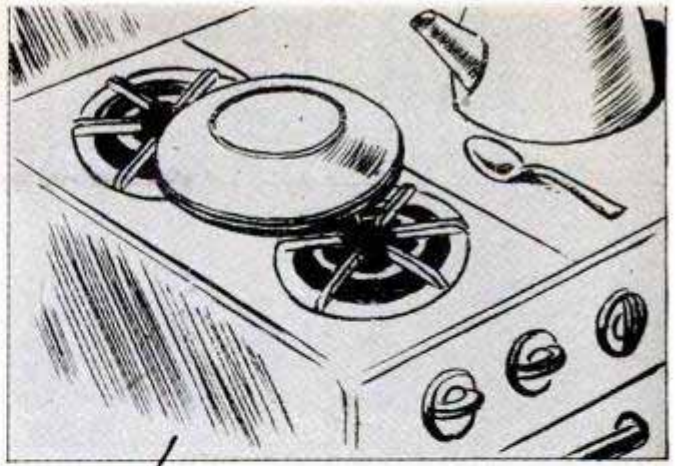
EXTENSION OUTLET for iron is fastened to ironing-board leg for maximum convenience. Outlet cord is stored by wrapping around ironing board, as above

PAINT-ROLLER PAN lined with hardware cloth, or sand screen, permits loading roller more evenly to improve finished paint job and prevent splattering





CARDBOARD TAB fastened to end of cloth measuring tape simplifies holding tape in place for accurate measurements. Tab is attached with cellulose tape

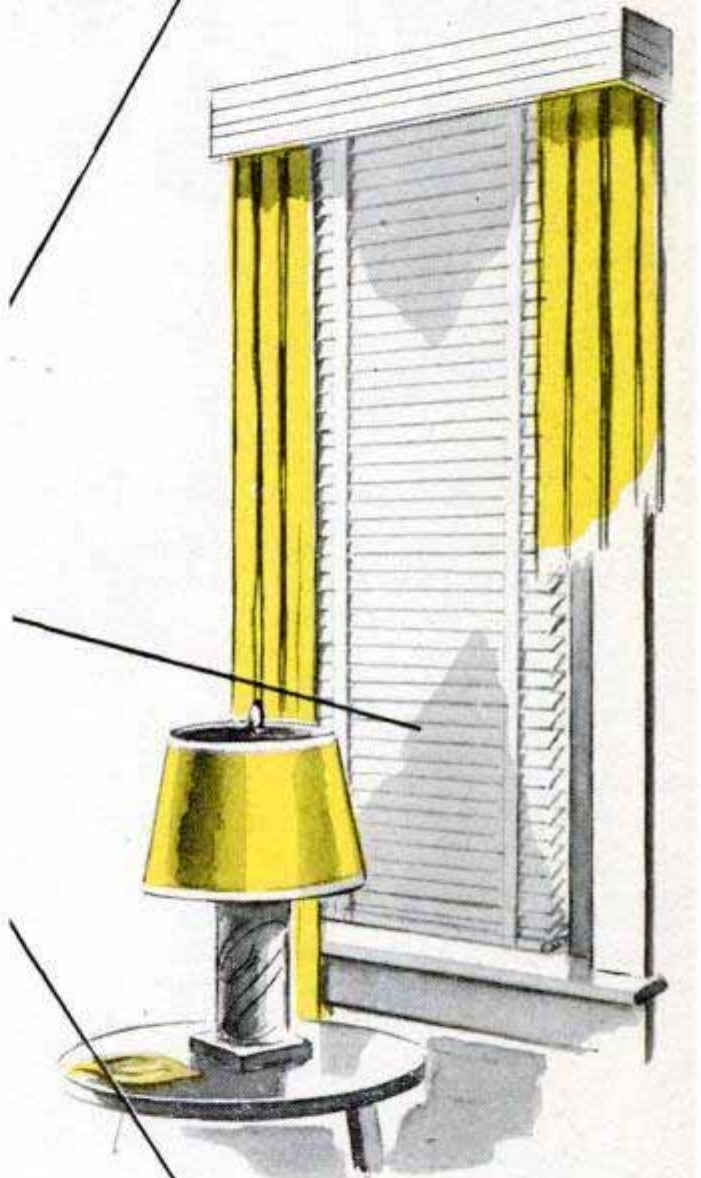
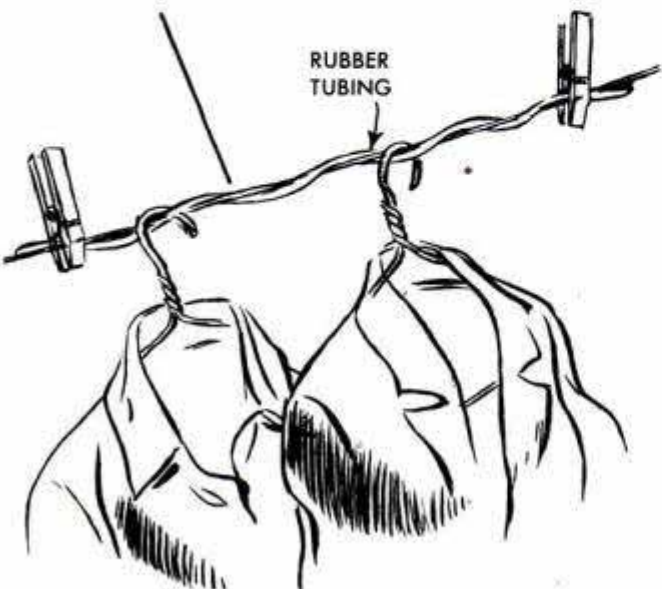


GAS-RANGE PILOT LIGHT doubles as food warmer when serving must be held for late arrival. Plate of food is covered by inverting second plate over it

VENETIAN BLIND too narrow for window may be used without detracting from appearance by centering it on window and covering the side gaps with draperies

TO SHELL LIMA BEANS quickly, use potato or carrot peeler having slotted blade. Run blade along edge of pod to release the beans without bruising them

RUBBER TUBING wrapped spirally around clothesline engages hooks of wire coat hangers to keep them from sliding. Tubing is held in place by clothespins



Shellacked Book Covers Easily Wiped Clean



If given three coats of white shellac or flexible paint, and then waxed, book covers can be wiped free of dirt and grease easily. The book is laid over a cardboard stand, and then a mixture of shellac, 2 parts, and thinner, 1 part, is applied with a good soft 2-in. varnish brush. With the brush fairly full, start at the top of the cover and work down rapidly, using light even strokes. Apply three coats, leave on the rack to dry and then wax. The cardboard stand is easily made by bending a sheet of cardboard into a triangle as shown, or by removing three sides of a cardboard box and then joining the top and bottom to form a triangle.—Burt Anderson, Tacoma, Wash.

Breaks in Recording Wire Spliced With Nylon Thread

After recording wire has been edited or a break spliced, it will sometimes refuse to pass through the recording head because the knot in the wire is too large. If a small section of nylon thread about 3 in. long is tied to the ends of the broken wire to act as a splice between them, this difficulty will be overcome. A knot connecting wire and thread is much smaller than one connect-

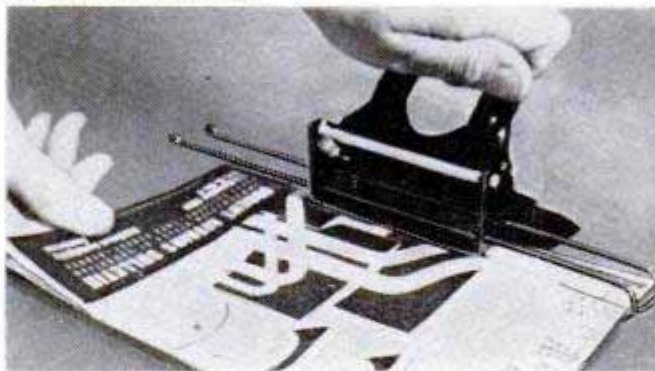
ing two ends of wire, and will have less tendency to stick in the recording head. To facilitate the tying of such knots, bring the two ends of the wire over the edge of the recording cabinet and fasten down with cellulose tape. This will keep the wire taut on the spools and prevent tangling while the tying is being done.

Karl L. Martin, Cleveland, Ohio.

Stop Bar on Office Punch Aligns Paper Accurately

Older types of office punches can be converted to register the holes punched in sheets of paper if equipped with a guide to show where the paper is placed for punching. Two holes are drilled through each post of the punch, and a U-shaped length of stiff wire is passed through the holes. The rounded section of the wire is bent downward to form a stop for the paper, and the two ends are bent over.

Don Farrant, Adelaide, South Australia.



Use Cellophane and Cement to Patch Leaky Gas Tank

Leaks in a gas tank can be repaired by cementing patches of cellophane over them with a regular cellulose-acetate household cement. After locating the leak, drain the tank and allow it to dry thoroughly before beginning the repair job. Then clean a 2 or 3-in. spot around the leak with emery cloth. Coat this area with household cement and

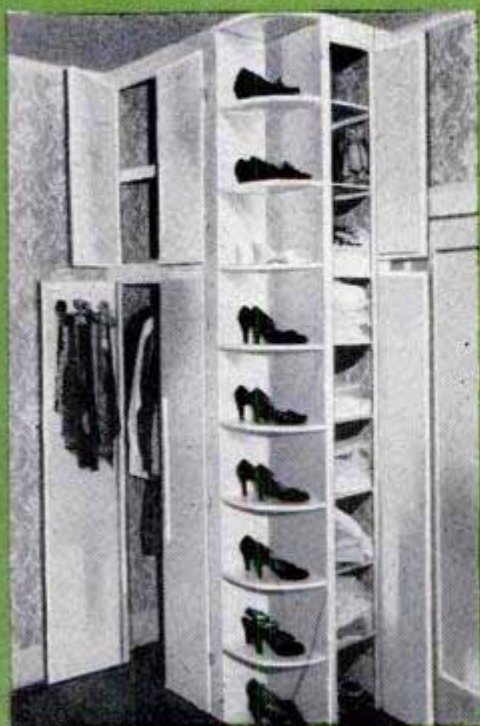
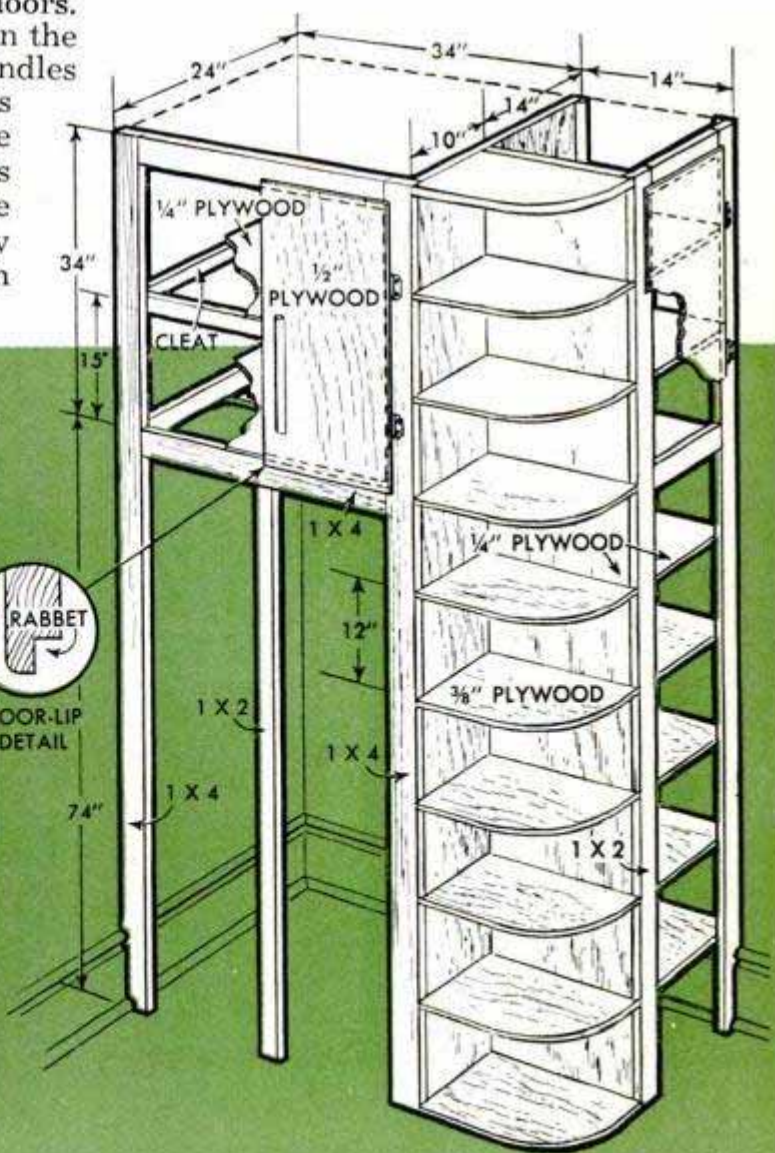
lay a patch of cellophane over it. When the first layer has dried, again cover the entire area with the cement and apply a second patch. Four or five layers should be applied to complete the repair. Use the cement liberally and allow ample time for it to harden before refilling the tank.

Archie R. Lowery, Syracuse, N. Y.

Combination WARDROBE AND LINEN CLOSET

By Don Lippke

HERE IS ONE homeowner's answer to the problem of not enough closet space. Built in one corner of the bedroom, the cabinet-type closet takes little floor space, yet does a big job in taking care of shoes, clothes and hatboxes, as well as linens, towels and blankets. If you dislike using the open corner shelves for shoes as pictured, some of the shelves may be used to display decorative hosiery and handkerchief boxes, pictures, etc. The frame is made of 1 x 2s and 1 x 4s, as shown in the detail. Quarter round screwed to the walls and ceiling covers the joints between the walls and the cabinet. The remainder of the construction is of plywood, $\frac{3}{8}$ -in. being used for the shelves, $\frac{1}{4}$ -in. on the walls and $\frac{1}{2}$ -in. for the doors. The doors are rabbeted, as indicated in the inset, to form a lip, and the door handles are made from quarter round. This is done for economy and also because the handles thus produced lend themselves nicely to the lines of the cabinet. The dimensions shown can be varied easily to suit the individual room in which the cabinet is to be built.



Brush Pile Burns Quickly With Leafy Parts at Edge



When starting a bonfire with brush, pile it so the branches will be at the center of the fire as illustrated. This will eliminate the necessity of continually pushing unburned portions of the branches into the fire. Start the fire by lighting the leafy parts of the branches. These, needless to say, should be thoroughly dry.

Hi Sibley, Nuevo, Calif.

Additional Leverage for Hammer



To provide a fulcrum on your hammer for pulling long nails, weld a piece of $\frac{3}{8}$ -in. bar stock or a square nut of the same thickness to the hammer head, as shown. This will save the time often spent in hunting a wooden block to put under the head. When used to pull shorter nails, the hammer will pull them out practically straight, making it possible to re-use them.

E. P. Benko, Hammond, Ind.

Emergency All-Purpose Glue Made by Burning Shellac

An excellent all-purpose glue for use when no other glue is available can be made by pouring a small amount of shellac into a container and burning it to reduce alcoholic content. As the alcohol is burned out, the shellac will thicken. While burn-

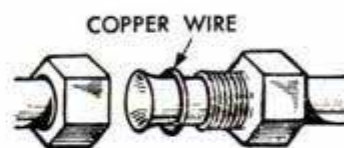
ing it should be watched carefully, and as soon as it reaches the desired consistency, the flame should be extinguished.

A. E. Fenn, Chicago.

Copper Ring Seals Connections In Car Oil Line

If you are unfortunate enough to have a slight oil leak at one of the connections in the oil line of your car, it often can be repaired by using a ring made from a piece of soft copper wire. The ring is formed to make a sliding fit at the flared end of the tubing. When the connection is again made you will find that the ring has taken up any play and usually will seal the connection tightly. If it does not, use two rings instead of one. Do not force the nut when tightening the connection but pull it up snugly.

Hugh Gordon, Aldershot, Ontario, Can.



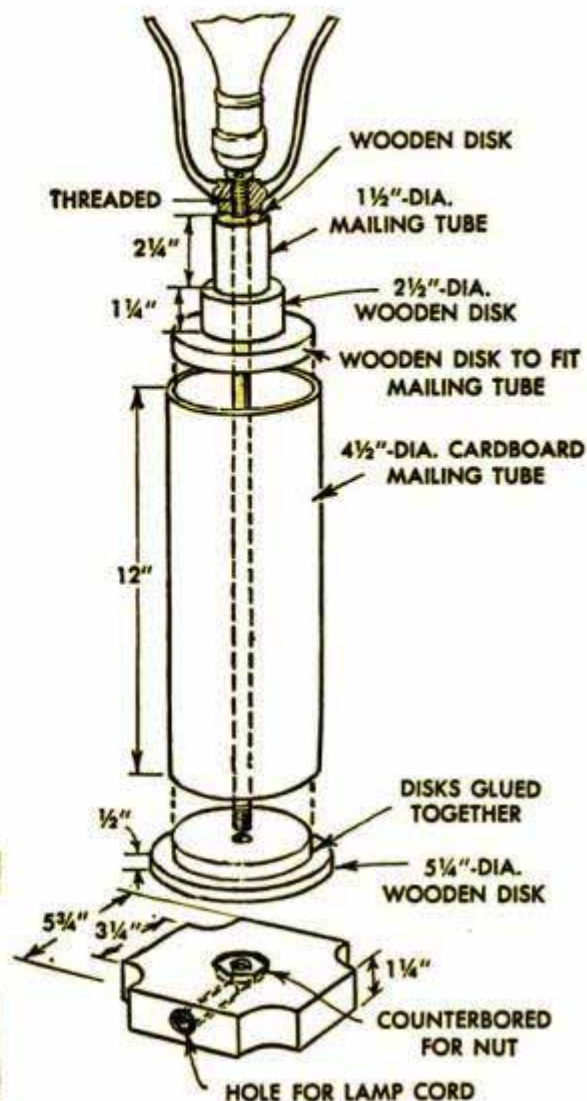
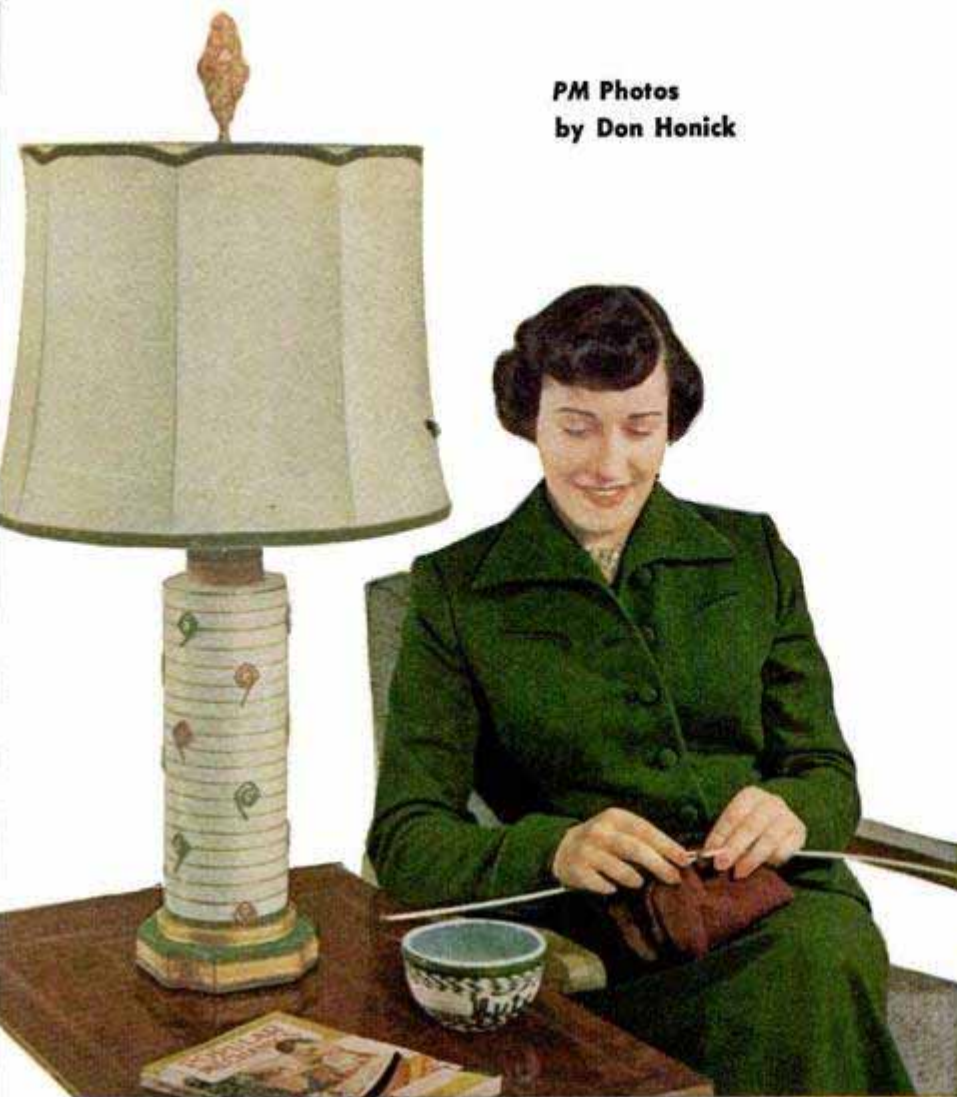
Proper Care and Cleaning Prolongs Luggage Life

The life of your suitcases and other luggage pieces will be doubled if you give them the proper care. After returning from a trip, clean them thoroughly before storing. Wash the leather parts with saddle soap or clean them with a cream-type leather cleaner. If the leather is scuffed and scratched, give it a couple of coats of flexible leather paint, such as described in the February 1953 issue of *Popular Mechanics*, which refinishes the leather. Brush the linings, using vacuum-cleaner attachments for a thorough job, and repair any damage to the lining at this time. Finally, use powdered graphite to lubricate the catches. Suitcases when stored can do double duty as storage space for outgrown baby clothes and seasonal apparel.

Blanche Campbell, Las Vegas, Nev.



PM Photos
by Don Honick



GLUE FOR FUN AND PROFIT

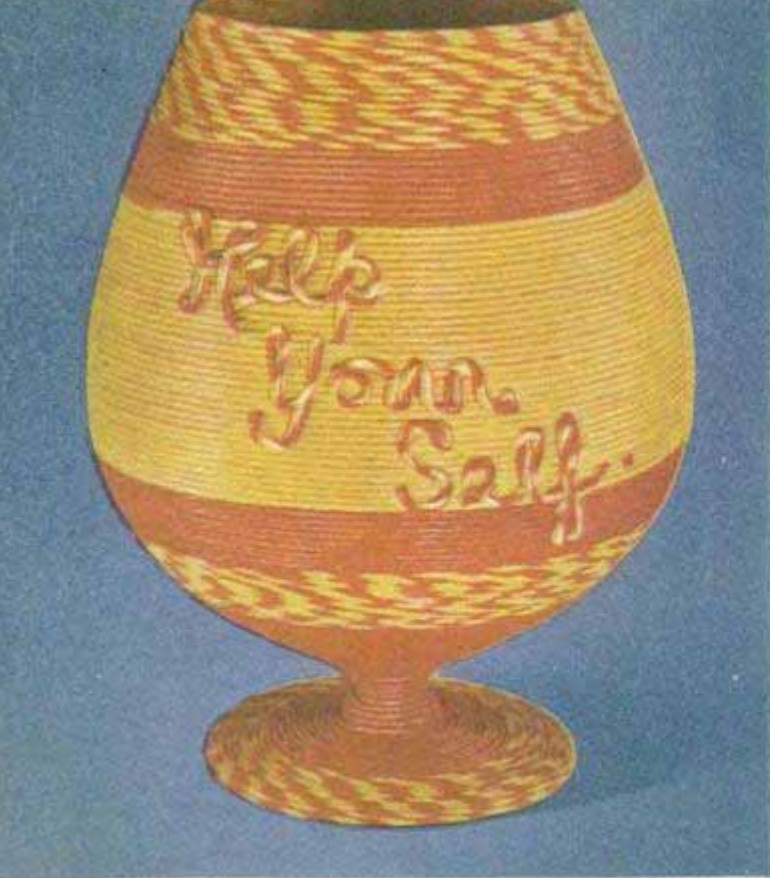
By Theodosia Carpenter

INEXPENSIVE GLASSWARE as well as a host of other odds and ends can be transformed almost magically into decorative bric-a-brac with the aid of a new water-soluble glue having several outstanding features of importance to the craftsman-hobbyist. The glue eliminates the tedious job of holding raffia and other materials in place while waiting for the adhesive to set, as it anchors the material immediately, even though it does not dry hard enough to prevent removal for quite some time. In addition, the glue dries to complete transparency, and this, combined with the fact that the excess glue can be wiped off with a damp sponge while working, makes it ideal for mounting decorative material, such as raffia, flitter and bits of plastic to glass, ceramic pieces, cardboard and other items. This glue, called Stik-Tite, is available at hobby shops and art stores.

Making colorful novelties in this way not only provides an interesting hobby, but also one which can grow into a profitable home business. Local gift shops and variety stores sell original creations such as these with little difficulty and, once you have established



Stamp-covered ash tray and green ceramic dish, pictured at the right, are examples of work possible with transparent glue



Distinctive candy dish, above, was made by covering plain glass vase with strands of colorful raffia. Note raffia "writing" glued to side of the bowl



Three interesting examples of raffia wrapping are shown above and at right. Note different decorative treatments

a few outlets, you probably will have all the orders you can handle.

The expensive-looking table lamp shown on page 161 is an example of what can be done with these materials plus a little ingenuity. The cylindrical lamp base is simply a cardboard mailing tube covered with hard twisted-paper raffia, small raffia designs being glued over the first layer. As shown in the detail, the bottom of the lamp base is of wood, drilled and counterbored to take the fixture pipe and the lamp cord. The lamp base pictured was painted green and trimmed with gold braid. However, the base may be wrapped with cord or covered with plastic veneer.

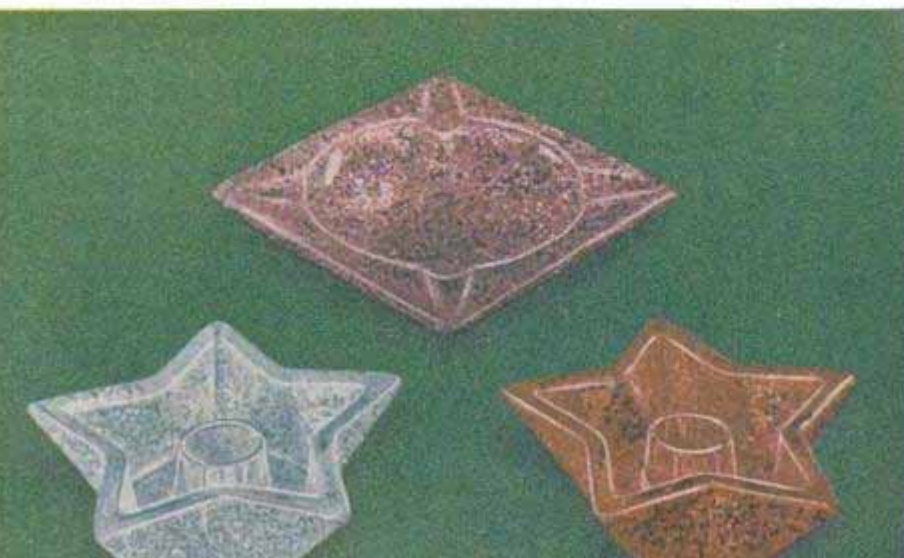
The raffia may be applied to the cylinder in a spiral wrapping or in individual strands to attain a horizontally wrapped effect. To apply the raffia, spread just enough glue on the cardboard to permit adding two or three strips of raffia and press the strands close together into the glue. As the wrapping progresses, wipe the surface with a moist sponge to clean off excess glue and also to smooth the finish.

To wrap the glassware pictured on this and the opposite page, begin on the underside of the stem or base, starting at the center and working outward. Apply the glue and clean off the surplus in the same way as when wrapping the lamp base.

In addition to the designs possible by varying the color and wrapping of the raffia, overlays of raffia strands can be glued to the original wrapping. Simple and effective designs, such as the flowers shown,



The ash tray and candlesticks, pictured at the left, were enhanced by a sparkling coating of glitter. Glue is applied to the glass and the glitter sprinkled over it, two coats being used if necessary



are possible by combining raffia with plastic clay which dries to a ceramiclike hardness when heated in a moderate oven. Like the raffia, the plastic-clay designs are glued in place.

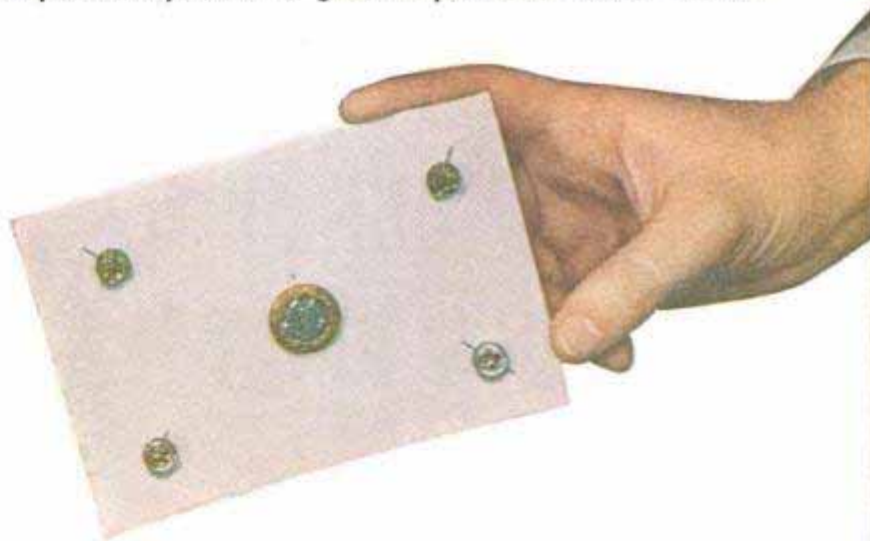
In addition to raffia, there is a wide variety of other decorative materials which can be glued to glassware with excellent results. The ash tray pictured on page 161, for instance, was changed from a nondescript piece of glassware to an ideal gift for the stamp collector. This was done at a cost of only a few cents by gluing a layer of common, almost valueless stamps, face-down to the underside and sides of the ash tray, the transparent glue becoming invisible upon drying. Then a second layer of stamps was glued face-up over the first layer and protected with several coats of clear lacquer or plastic.

The ceramic dish pictured below the ash tray and also the buttons at the right show how the multi-colored effect of fused ceramics can be duplicated easily by gluing flitter to glass. Simply cover the surface with several layers of flitter, sprinkling it over the glue to form the desired pattern, and then finish with several coats of clear lacquer or plastic. Use as many coats as are necessary to form a smooth, glasslike finish.

Ash trays, candlesticks and novelty glassware can be given a distinctive appearance by applying a coat of glue to the surface and sprinkling with flitter in the desired color. The tiny plastic dots punched out of sequins also are suitable for this purpose. If the glass is not covered completely with the first application, add another coat of glue and a second layer of the decorative material. Cover the finished piece with clear lacquer or plastic. When decorating ash trays, be sure to coat only the outside of the glass with the material, as the inner surfaces would be stained and marred quickly. In all work of this type, keep in mind that several coats of clear lacquer or plastic applied to the finished product will provide a pleasing and durable finish. The lacquer can be brushed or sprayed on the work, and the plastic is available in pressurized containers for easy spraying. ★ ★ ★

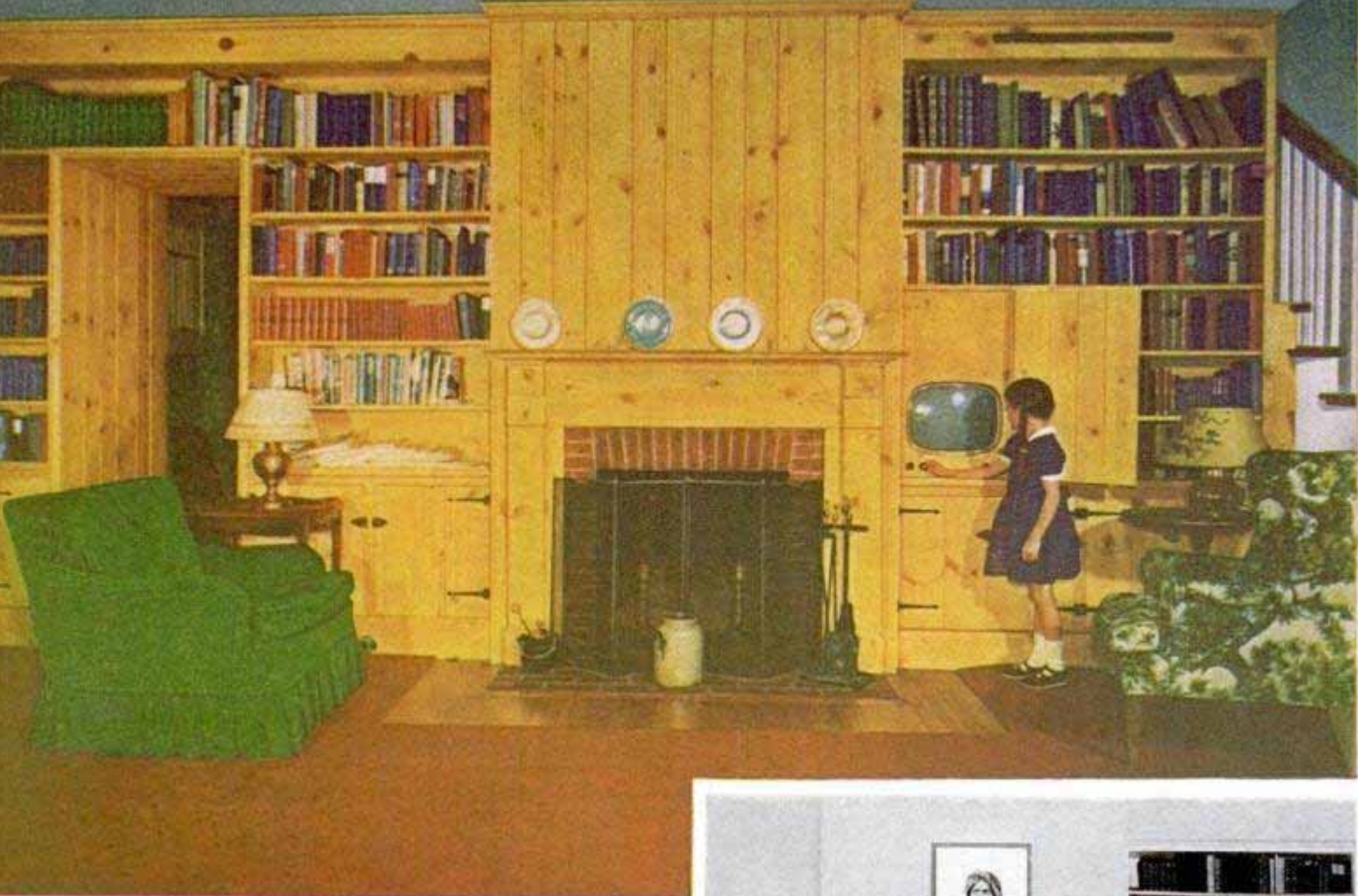


Flower overlays on decorated bowl, above, are made of raffia and plastic clay. Latter is glued in place and heated in oven



Fused-glass effect on buttons pictured above is obtained by applying glue to surface of button and sprinkling flitter in contrasting colors over the glue. Green and white raffia are pleasingly combined to decorate nut and candy bowls, below





BOOKSHELF WALL FEATURES BUILT-INS

By Richard F. Dempewolff

THE TV SET, radio, record player and assorted bookcases and magazine racks that once cluttered up my living room, are now incorporated in the knotty-pine bookshelf wall pictured above. Not only does this unusual wall treatment add new life to an otherwise ordinary room, but it increases the actual living area of the room to a surprising extent. I happened to have a fireplace which was especially well suited to this type of wall but, with or without a fireplace, you can accomplish the same thing by redesigning the wall to serve your purpose. In addition to saving space in the living room and increasing storage space for odds and ends, the bookshelf wall is a practical work saver, as it conceals any number of dust catchers under one roof. In my particular case, a deep utility closet was installed directly in back of the bookshelves at the left of the fireplace.



A door of V-joint, knotty-pine boards, located just to the right of the fireplace, closes over the TV screen and, next to this, three hinged bookshelf sections permit access to FM-radio and amplifier control panels, plus a 3-speed record player which is mounted on a sliding drawer. The hinged bookshelf sections actually are false book backs fastened to panels of 1/4-in. plywood. Opening the pair of cabinet doors below the electronic equipment reveals a high-fidelity speaker. The other cabinets beneath the bookshelves are ideal for storing records, games, toys, magazines and all those things for which you ordinarily don't seem to find room.

If your fireplace, like mine, extends a couple of feet into the living room, you will have no problem in attaining the depth necessary for installation of the TV set. However, if the fireplace projects only a



If fireplace wall tends to become warm, it is best to apply insulation between wall and television set



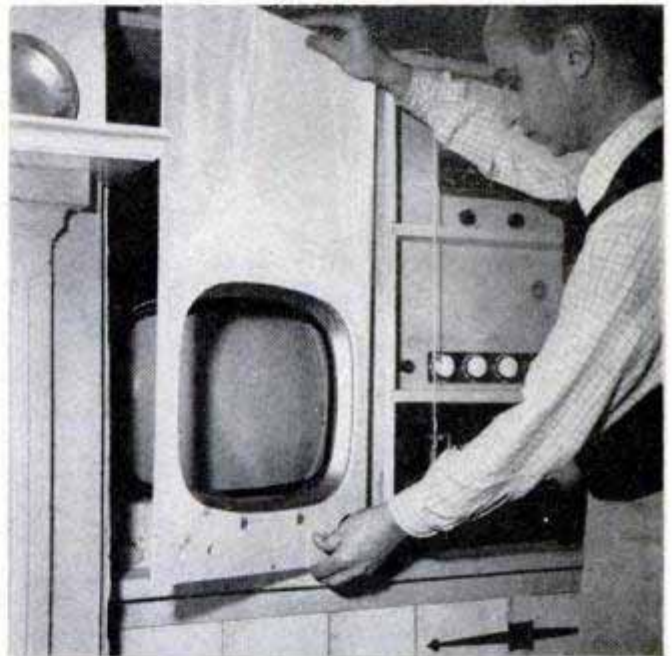
Knotty-pine plywood is nailed to 2 x 2 studs, as in photo above. Space behind TV and radio is left open

few inches from the wall, it may be necessary to knock out the wall and move it back the required distance, or cut through the wall and allow the TV chassis to extend into an adjoining closet. Because every installation is bound to be different, these are things you will have to work out for yourself. Keep in mind that the top of the TV screen should be about 42 in. above the floor, and check the dimensions of the TV chassis carefully to be sure that sufficient room, especially depth, is available.

The cutaway detail on the next two pages will give you an idea of the general construction of a bookshelf-wall unit. Note that the shelf framing on the TV side of the fireplace is braced with lengths of 2 x 2. The braces are nailed to horizontal cleats which have been nailed to the wall studs.

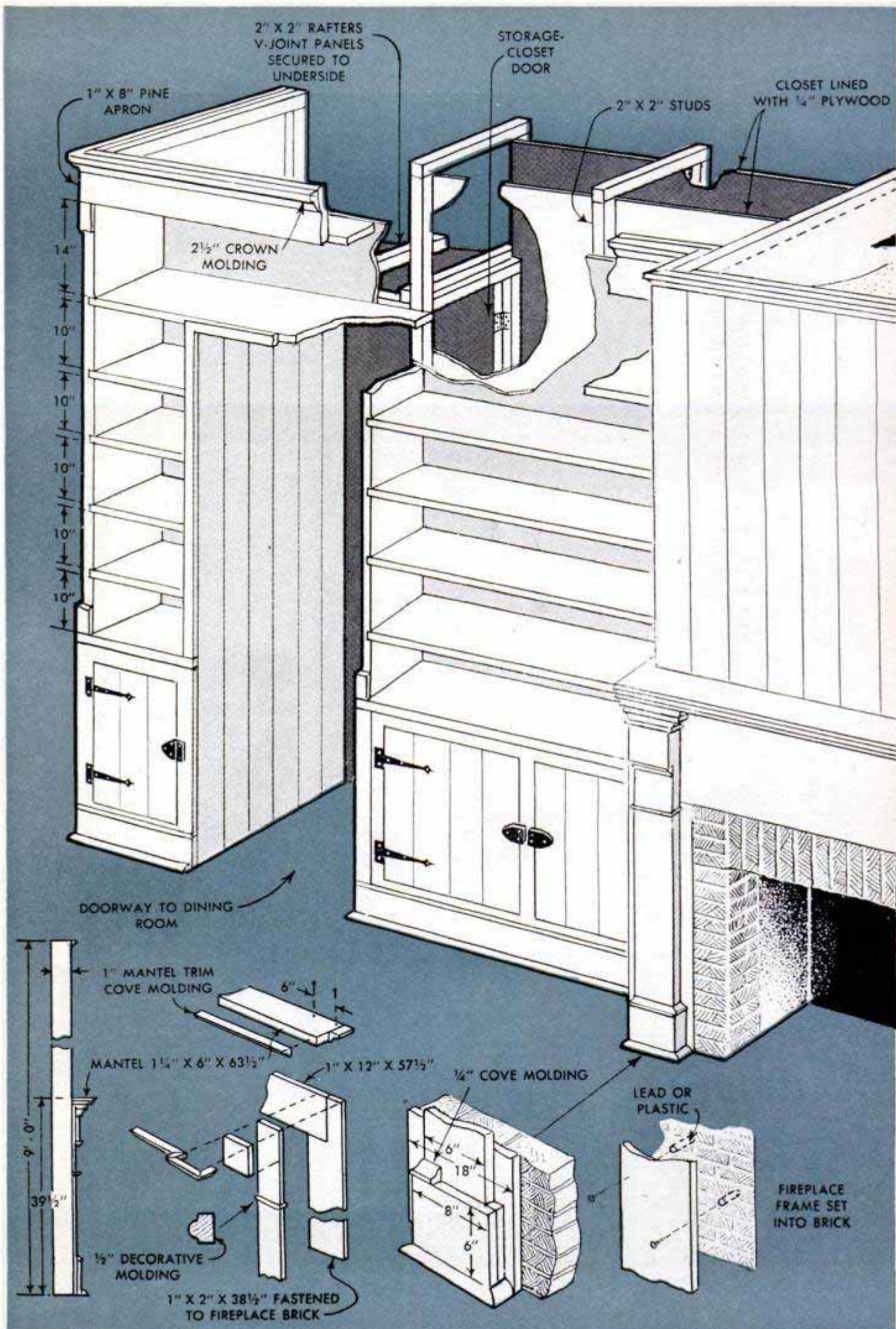
The bottoms of the lower cabinets are raised about 6 in. above the floor, so armored cable can be brought under them for wiring the electronic equipment as well as several conveniently located electrical outlets. The fronts of the cabinet bases are covered with 1 x 6 knotty-pine boards and quarter-round shoe molding. Construction of the cabinets is shown in detail D, page 168, and cupboard-door construction is illustrated in detail C.

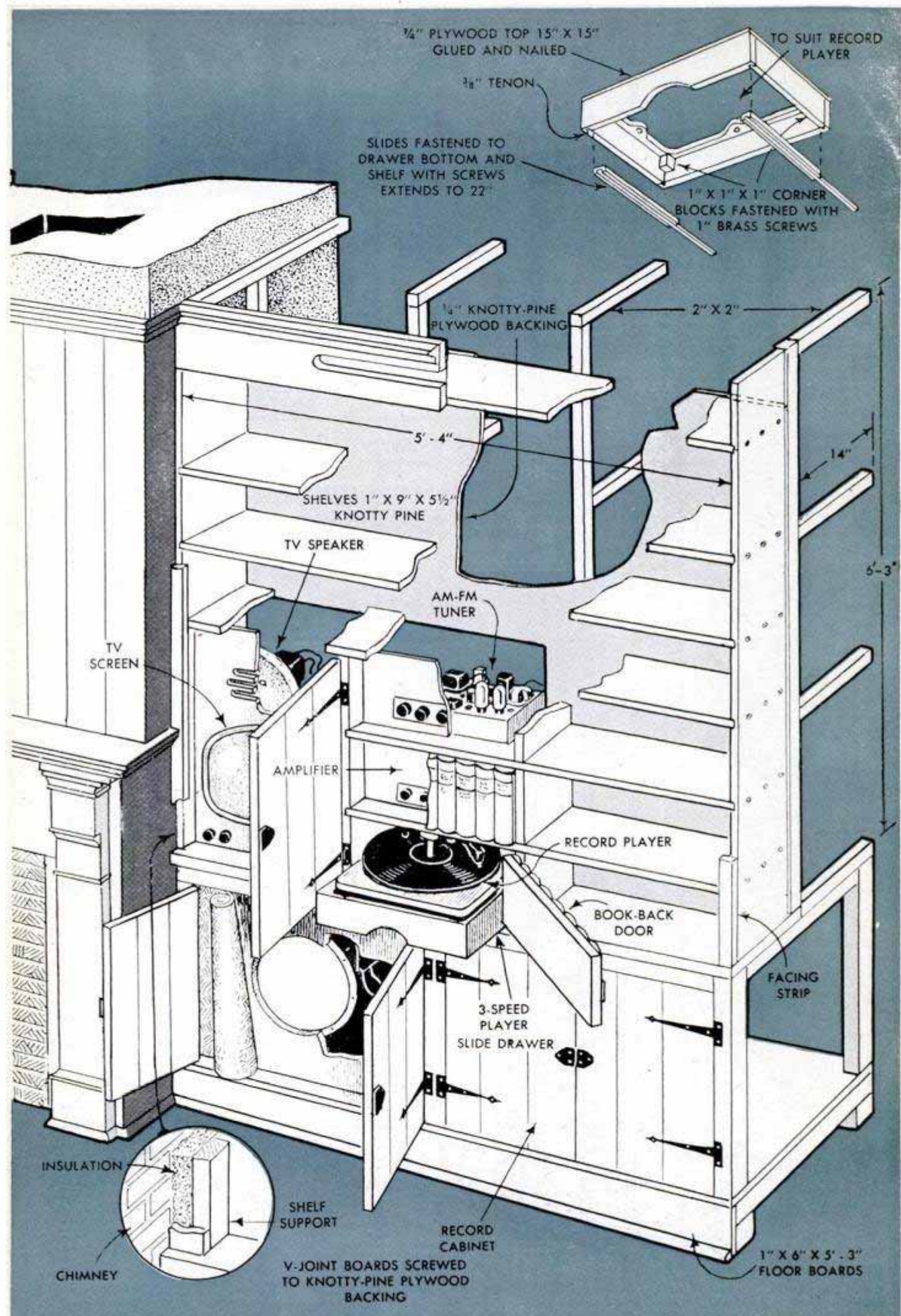
The bookshelves are backed with panels of 1/4-in. knotty-pine plywood. This paneling is cut to leave the area directly behind the electronic equipment open, thus allowing heat from the equipment to escape by passing upward behind the bookshelves and out through a long slot cut in the 1 x 8 apron which runs across the top of the shelf section. Ventilation is important, as the heat from the tubes, if confined, will shorten the lives of condensers and other parts of the equipment. The ends of the shelves

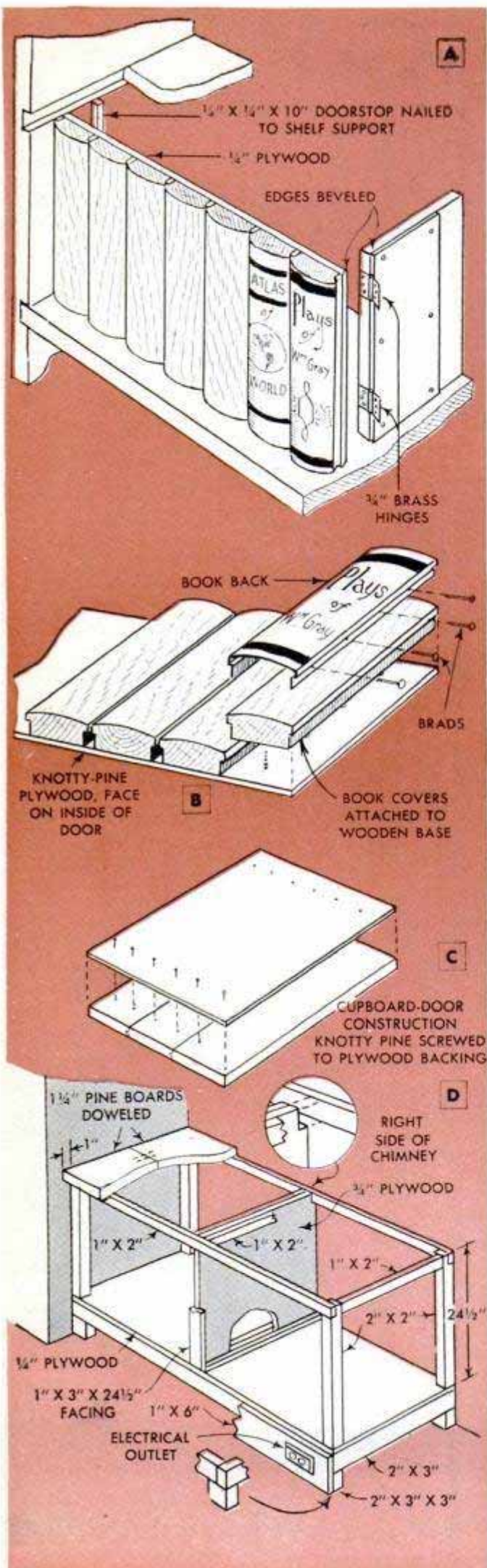


TV set, manufactured by Industrial Television, Inc., is fitted with plywood panel, above. Radio-phono combination, below, was prepared by Lafayette Radio

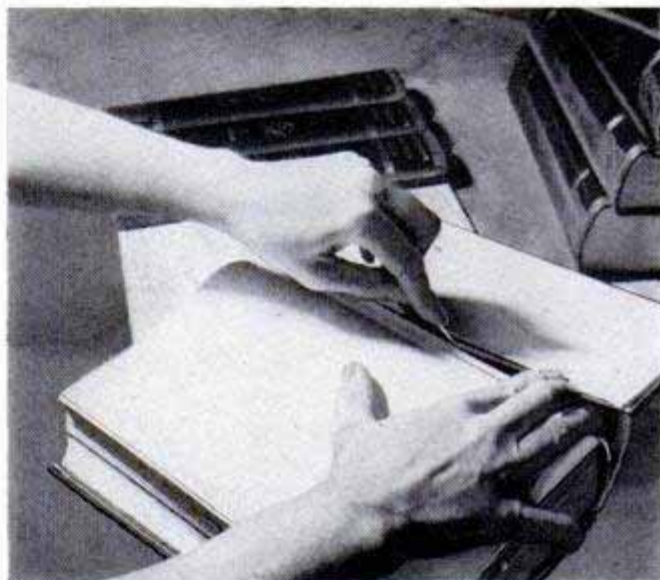








Book-cover backs cemented to wood blocks simulate rows of books. Blocks are screwed to plywood panels



Entire book cover is removed with razor blade and both covers are cut off about 1 in. from the back

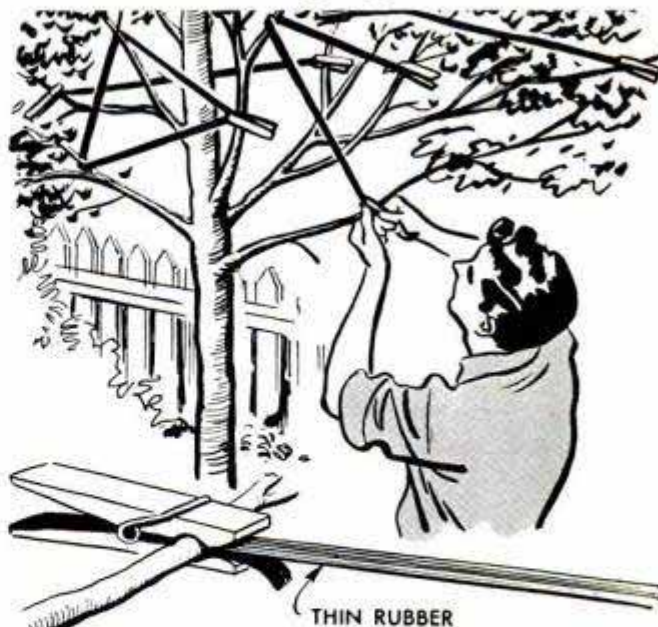
fit into grooves cut in the inside faces of the vertical side boards. If the shelves are quite long, they should be supported at intervals along their length to prevent sagging under the weight of the books. This can be done by installing short lengths of board vertically between the shelf boards or by driving long wood screws through the 2 x 2 studs and into the shelf edges.

If the fireplace brick tends to become warm, the area between the fireplace and the electronic equipment should be insulated to keep the equipment as cool as possible. Construction of the false bookshelf doors for the control panels and record player is shown in details A and B. The photos above picture how covers from old books are removed and glued to shaped wooden blocks to simulate actual books. If you like, paper book jackets may be used instead of covers. ★ ★ ★

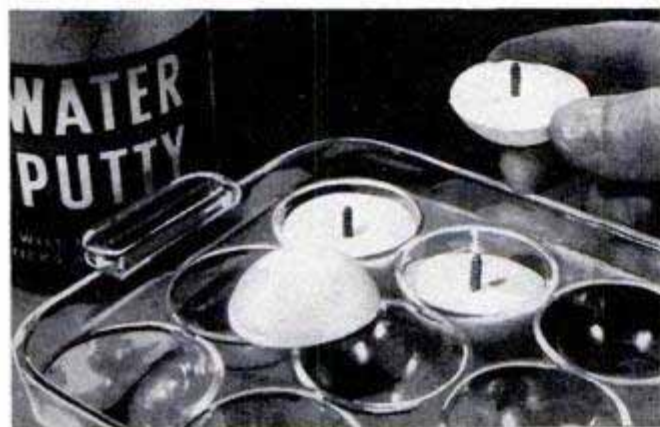
Rubber Strung Between Branches Causes "Singing Tree" Effect

Much to the delight and mystification of his family and friends, as well as occasional passers-by, one homeowner figured out a simple means by which he was able to make certain trees in his yard "sing" in varying pitches as the wind passed through them. The effect was created by stringing several strips of rubber — stretched only slightly — between the branches. Tonal pitch varied as the wind caused the moving branches to increase or decrease the tension on the strips. The strips, which can be cut from a discarded, thin-walled bicycle tube, rubber apron or hot water bottle, should measure from $\frac{1}{4}$ to $\frac{3}{8}$ in. wide and from 10 to 18 in. long. Spring-type clothespins are used to secure the strips to the branches.

A. H. Waychoff, Phoenix, Ariz.



Feet for Ornamental Box Cast From Wood Putty With Egg-Tray Mold



If rounded feet are desired on a small ornamental box, they can be cast easily from any of the various wood putties in the concave depressions of a plastic egg-storage tray. The inside of each depression is coated with petroleum jelly before the putty is placed in it to simplify removal when the feet are dry. Before the putty sets, small wood screws are embedded head downward in the center of the mold. When hardened, the flat side is scraped smooth with a knife. After they are attached, the feet are finished to match the box itself.

Permanent Check List Reminds Campers to Take Everything

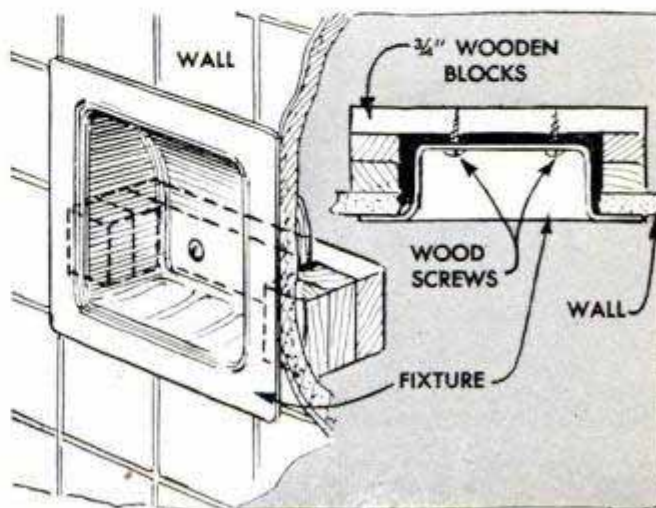
To serve as a reminder to pack necessary items for a camping trip, one family uses a permanent check list on which each item is checked off as it is packed. The list is mounted on a $\frac{1}{4}$ -in. piece of plywood and a small hole is made in the wood with an awl or ice pick at one side of each item. Then as each is packed for the trip, a small

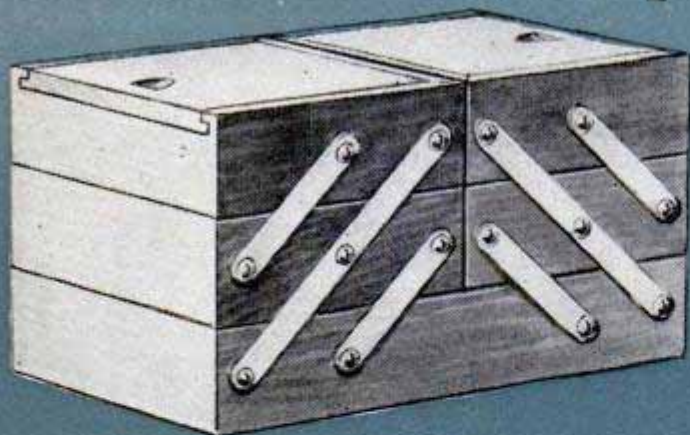
colored pin is inserted in the hole. The plywood panel is first shellacked, and then given two coats of varnish. The paper on which the list had been written is coated front and back with a clear lacquer, and laid on the plywood after the second coat of varnish has become tacky.

Clinton R. Hull, Costa Mesa, Calif.

Anchoring Recessed Fixtures In Bathroom Wall

When installing soap dishes or other recessed bathroom fixtures in existing walls where no backing for wood screws is to be found, you can use wooden blocks to anchor the fixture in place. Made of $\frac{3}{4}$ -in. stock as shown in the drawing, the anchoring frame is inserted in the opening cut in the wall to receive the fixture. Screws are then driven through the back of the fixture into the wood. As they are tightened, the fixture will be clamped tightly against the wall.—George B. Moses, Unionville, Conn.





SEWING BOX

Lumber

- 2 pcs.— $\frac{1}{4}$ " x $4\frac{5}{8}$ " x $5\frac{5}{8}$ "—Tops
2 pcs.— $\frac{3}{8}$ " x $1\frac{3}{4}$ " x 6"—Ends
8 pcs.— $\frac{3}{8}$ " x 2" x 6"—Ends
8 pcs.— $\frac{3}{8}$ " x 2" x 5"—Sides
2 pcs.— $\frac{3}{8}$ " x 2" x 10"—Sides

Plywood

- 4 pcs.— $\frac{1}{4}$ " x $4\frac{5}{8}$ " x $5\frac{5}{8}$ "—Bottoms
1 pc.— $\frac{1}{4}$ " x $5\frac{5}{8}$ " x $9\frac{5}{8}$ "—Bottom

Miscellaneous

- 12-Dowels— $\frac{3}{16}$ " dia. x $1\frac{5}{8}$ " long
4-Fulcrums— $\frac{1}{16}$ " x $\frac{1}{2}$ " x $6\frac{5}{32}$ " brass
8-Fulcrums— $\frac{1}{16}$ " x $\frac{1}{2}$ " x $3\frac{11}{32}$ " brass

SEWING-AND-CUTTING TABLE

Lumber

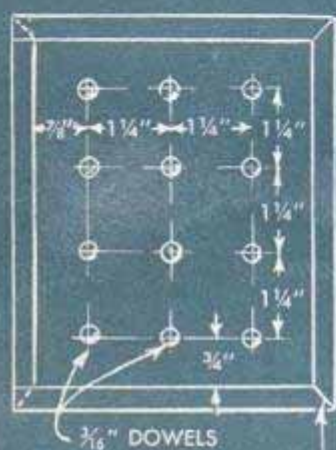
- 4 pcs.— $\frac{3}{4}$ " x $4\frac{3}{16}$ " x 32"—Aprons
6 pcs.— $1\frac{1}{2}$ " x $1\frac{1}{2}$ " x $27\frac{1}{2}$ "—Legs
2 pcs.— $\frac{3}{4}$ " lumber—Cover sides
2 pcs.— $\frac{3}{4}$ " lumber—Machine-opening sides
2 pcs.— $\frac{3}{4}$ " lumber—Machine supports

Plywood

- 2 pcs.— $\frac{3}{8}$ " x 32" x 32"—Tops
1 pc.— $\frac{3}{8}$ " plywood—Machine cover

Miscellaneous

- 2-Hinges— $1\frac{1}{4}$ " x 2" open
6-Leg braces
2-Bullet catches
1-Handle
2-Suitcase bolts



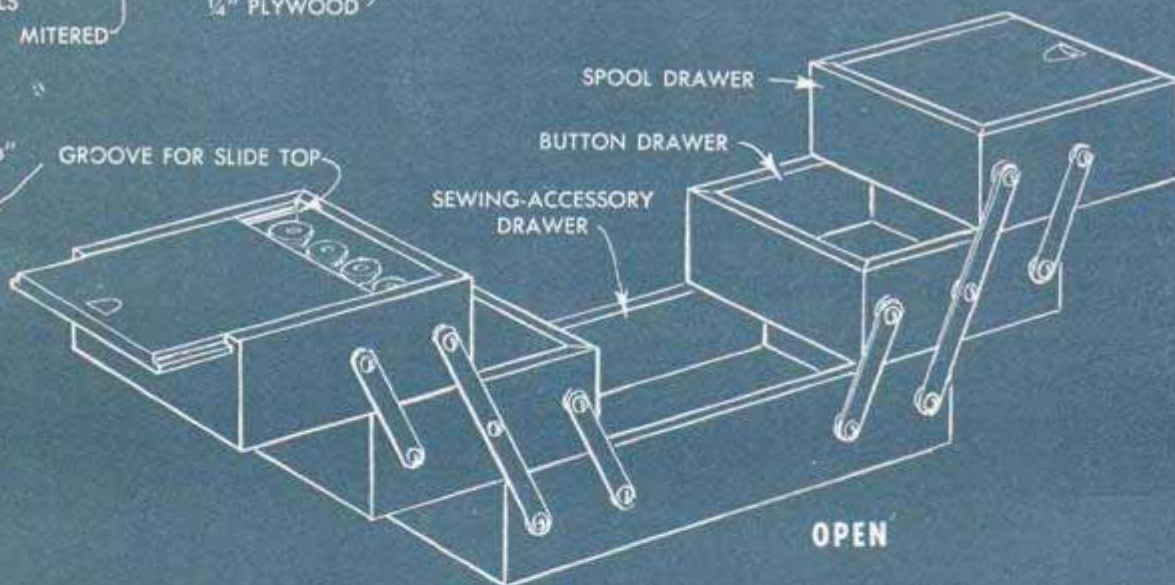
PLAN OF SPOOL
DRAWER



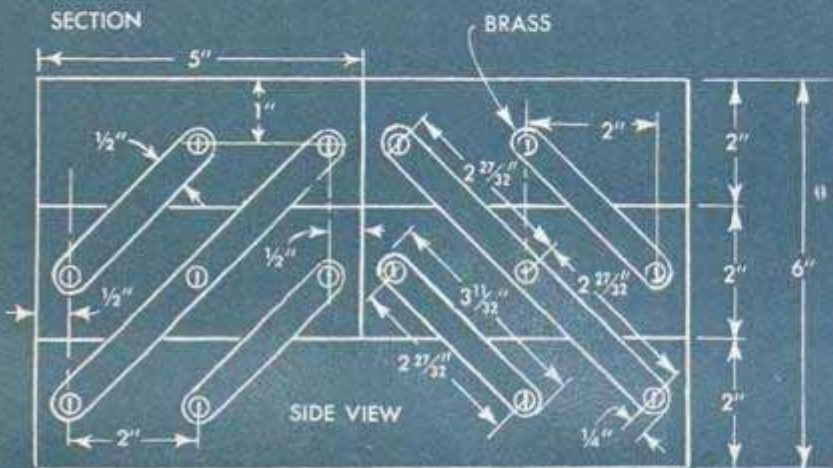
$\frac{1}{4}$ " PLYWOOD



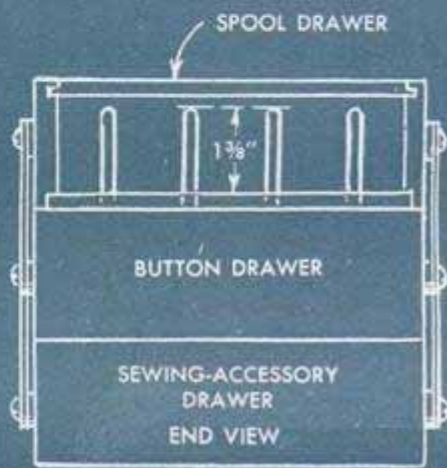
SECTION



OPEN



SIDE VIEW

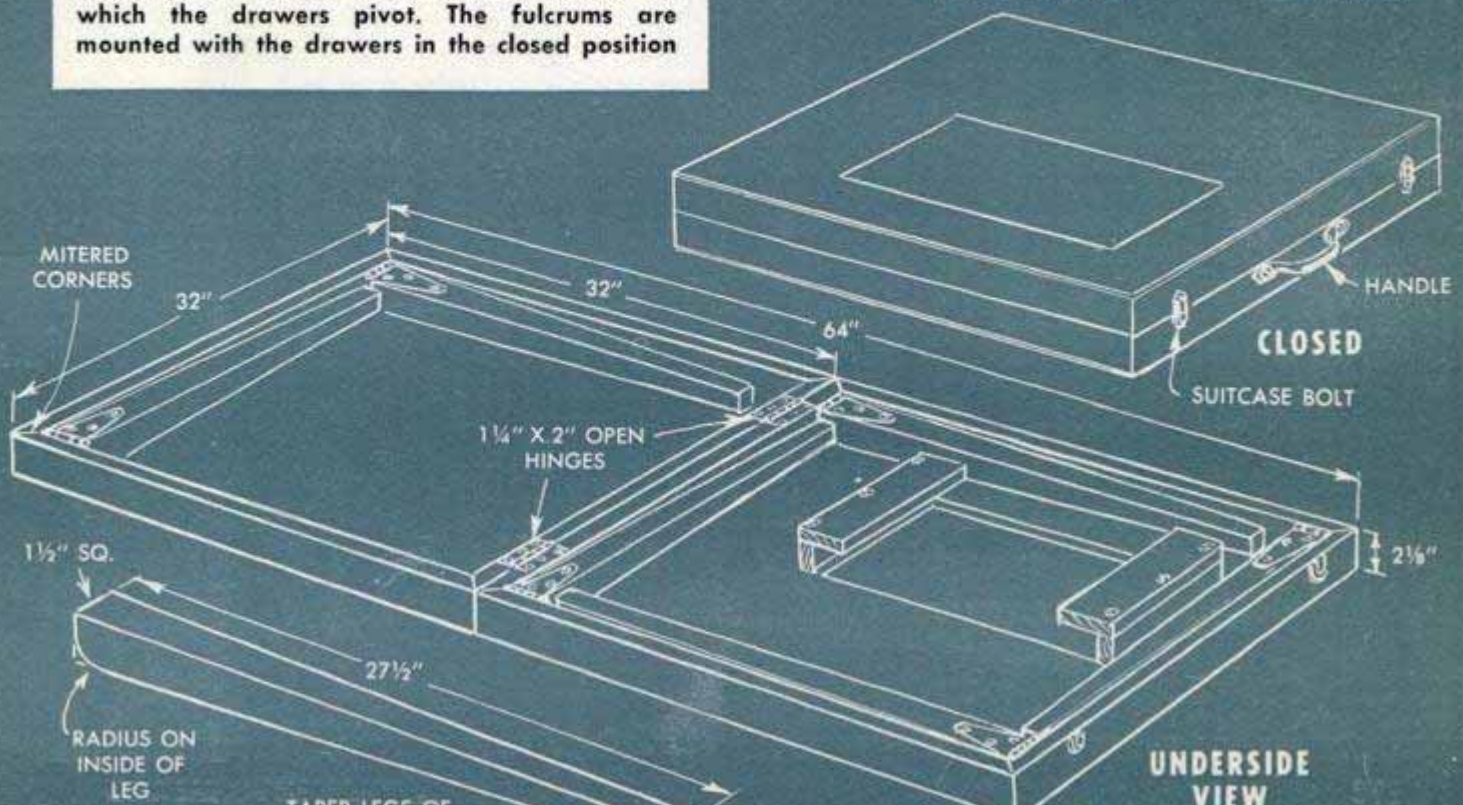
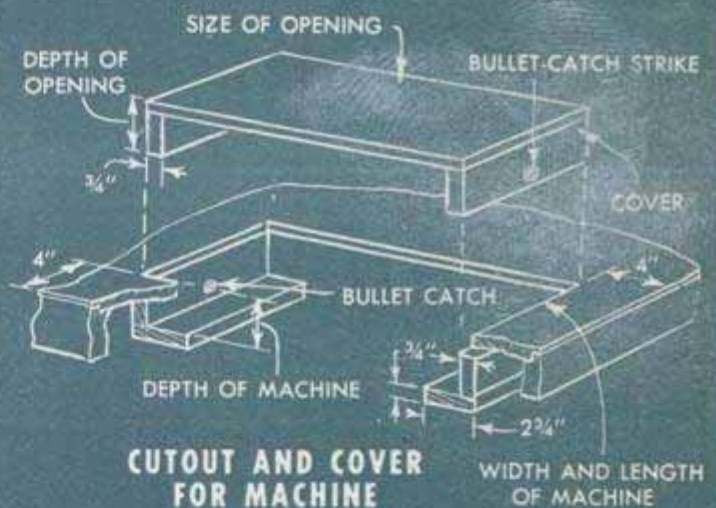


END VIEW

...Sewing Box and Table



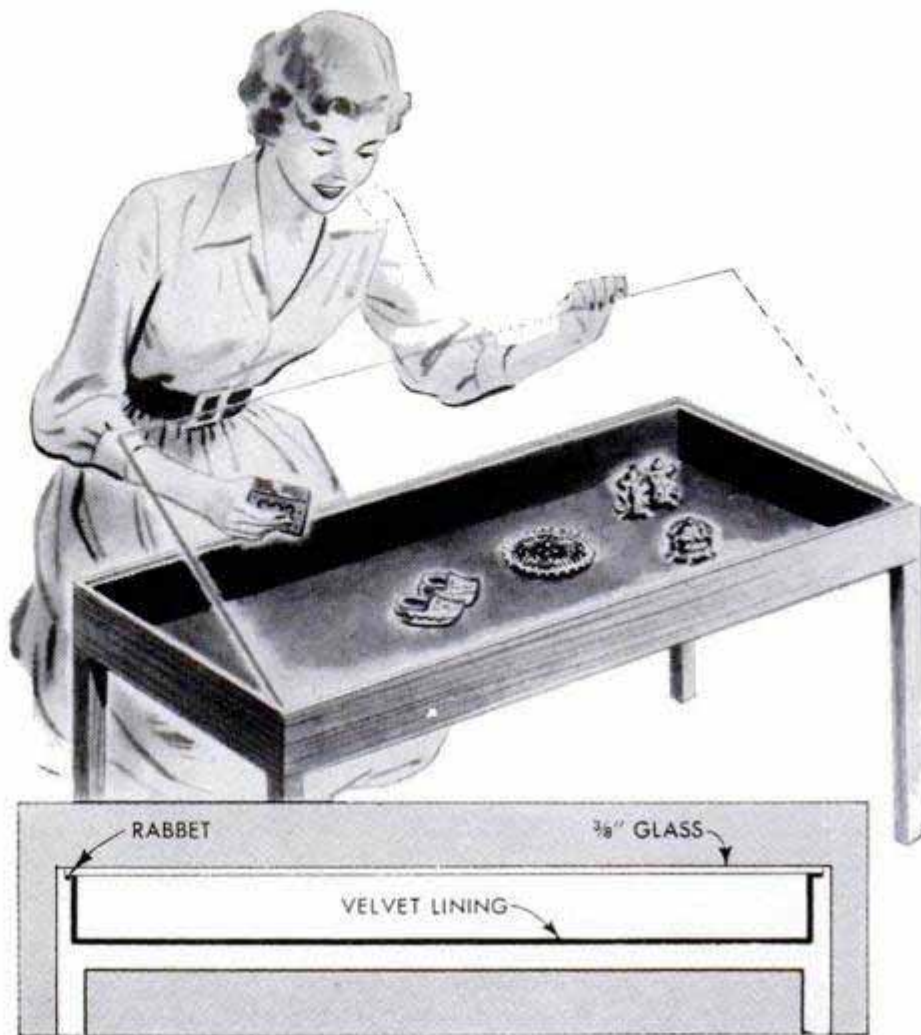
When a housewife sets out to do a big job of sewing, such as new draperies or slip covers, she needs the proper working space. Our plans this month show a sewing-and-cutting table that will make her work easier, and a sewing box to keep supplies right where she wants them. The table, which folds into a compact unit for storage, features a well into which the sewing machine is set. All of the table dimensions are given except those for the machine cutout, which are determined by the particular machine used. The sewing box is small, yet capable of holding many supplies because of the unique pivoting drawers. Care must be taken in making and mounting the fulcrums, cut from 1/16 x 1/2-in. brass, on which the drawers pivot. The fulcrums are mounted with the drawers in the closed position



Glass-Topped Coffee Table From Piano Bench

A lovely glass-topped coffee table in which you can display a hobby collection, family mementos or items of beauty can be made from a piano bench. Remove the seat of the bench and line the music compartment with velvet or other suitable material. Rabbet the inside of the top edge so that a sheet of heavy plate glass can be inset. To prevent any liquid that might be spilled on the surface from seeping into the display compartment, glue a thin strip of foam rubber to the bottom of the rabbet, so the glass rests on it. So that the glass cover may be lifted easily, tack a small strip of cloth tape to the inside of the bench as a pull tab. Run the tape across the rabbet and allow it to extend above the edge of the glass.

Pat Fey, New York City.



Catch Fish as They Feed for the Winter Months

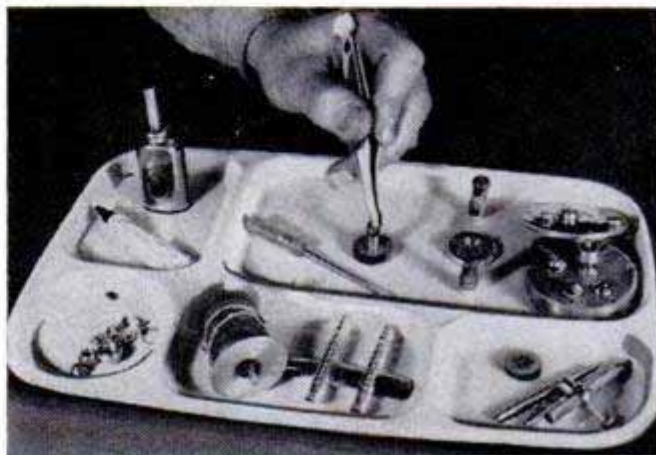
As winter approaches and the water in lakes, rivers and streams drops in temperature, fish begin feeding to put on fat for the cold months ahead. Fishing is then at its best. Pike will have shed their teeth and will be on the feed; bass will be in a striking mood and walleyed pike will hit any bait, natural or artificial. Worms, crickets and walnut-tree caterpillars are all good pan-fish baits, while pike, bass, walleyes and other game fish will take large min-

nnows and crayfish. Two or three large worms or night crawlers on a hook, with the ends left loose to wiggle as an attracter, are fine for bass and walleyes in the fall. Top-water plugs are effective in the fall because game fish have come up out of their deep-water haunts. A killing lure for large pike at this time is a large bucktail behind a flashing, spinning blade. Pan fish will take almost any colorful trout fly or hair bug.—R. A. Jenkins, St. Louis, Mo.

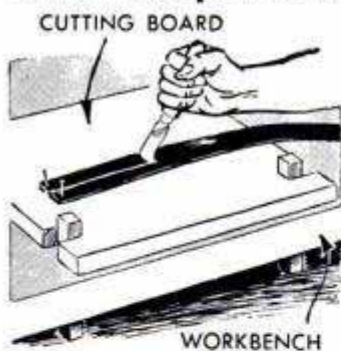
Small Parts Kept Separated in Sectional Serving Tray

Whether you are cleaning a fishing reel or overhauling an automobile carburetor, a metal or plastic serving tray similar to the one shown will come in handy for storing the parts temporarily. Distributed in the shallow, concave sections of the tray, the parts not only will be separated, but round parts and ball bearings will be prevented from rolling off the table or workbench.—Ed Packer, Chicago.

☞ To purify and whiten a sponge, soak it in milk and rinse in warm water to which has been added a little carbolic acid.

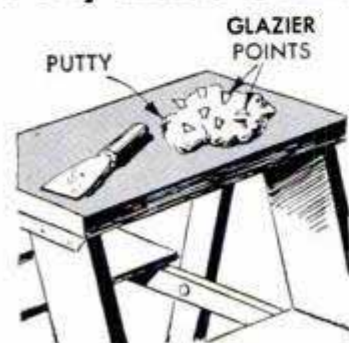


Bench Stops Lock Cutting Board



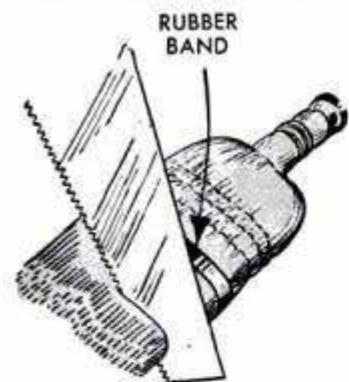
If you have frequent occasion to use a cutting board, you may avoid the annoyance of having it slide on the workbench while the work is in progress, and at the same time free one hand to manipulate the work. Merely slot the board at each end to fit over a pair of bench stops which are driven up to lock it in place.

Putty Holds Glazier Points



When glazing first-floor windows without removing the sash, you can keep the glazier points conveniently at hand by sticking them in a dab of putty. The putty adheres to the top step of the ladder so that the points will not be spilled when the ladder is moved from place to place and makes them easy to grasp.

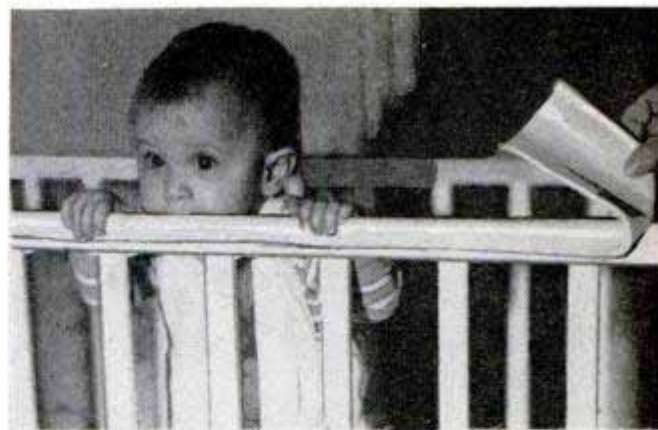
Worn Whisk Broom Cut Square With Saw After Freezing



Don't throw away that old whisk broom—at least, not before trying this method for making one useful again! Simply snap a rubber band around the straws, dip it in water and then place it in the freezing compartment of your refrigerator. When frozen, remove the broom and cut it with a small handsaw as shown.

Eraser Sands Smooth Surfaces

Sharpened to a wedge point, a pencil-type ink or typewriter eraser will come in handy on any job requiring an extra-fine abrasive for smooth surfaces. It is especially useful for removing spattered paint from glass or porcelain, taking spots off chromium or stainless-steel surfaces and also for removing scratches and stains from wood finishes. It can be cut to fit into difficult corners.—Norm Jacky, Fond du Lac, Wis.



Plastic Strip on Crib Rail Protects Teething Baby

When our baby developed a fondness for chewing the top rails of her crib during the teething stage, we covered them with strips of plastic fabric to eliminate the possibility of her swallowing bits of wood and paint. The strips were cut to cover the tops and sides of the crib rails, as shown, after which cloth piping was stitched to the edges. This made it easy to draw the plastic around the rails and secure the strips with heavy thread laced across the underside of the rail.—Arne O. Solonen, Raymond, Wash.

Turkish Towel Makes "Grass" For Model Railroad

Ordinary lightweight Turkish toweling can be used to make realistic looking "grass" for model railroads and other model projects. First, stain a piece of the toweling with a light-brown wood stain, then stretch the fabric flat and tack it down. While it is still wet, dab lightly with yellow-green, then blue-green, and finally forest-green paint, using an irregularly shaped pad of toweling as an applicator. Let some of the brown show through and overlap the colors, but don't form a regular pattern. Use poster, textile or flat flexible paint, but avoid glossy paint or enamel. After painting, shake the towel well to remove excess paint and to loosen tufts of toweling which have become matted. Hang to dry and shake out frequently during the drying to prevent further matting.

Cover 'em up . . .

with new, modern wall coverings that hide cracks and other unsightly blemishes "but good." They provide permanent finishes for new construction, too, and offer almost unlimited decorating possibilities. Read the story in the October issue that pictures and describes them all; "knotty"-pine panels, plastic-coated papers and hardboards, striated-wood panels, plastic tile, cork and many other modern coverings



Ceiling-high cornice covered with fabric to match draperies brightens alcove, above. Sides and top of window, below, are decorated with scrolled cornice

THE NEW TREND— Window Cornices

CORNICES ARE BECOMING more and more important as a decorator's aid for creating a wide variety of pleasing effects in the home. They are used to accent windows, give the effect of a longer or shorter wall or a lower ceiling, to conceal drapery hardware, exhaust fans and lights and to change the center of interest in a room. If you are thinking about putting up cornices in your home, consider all the different types and their intended uses before making your selection.

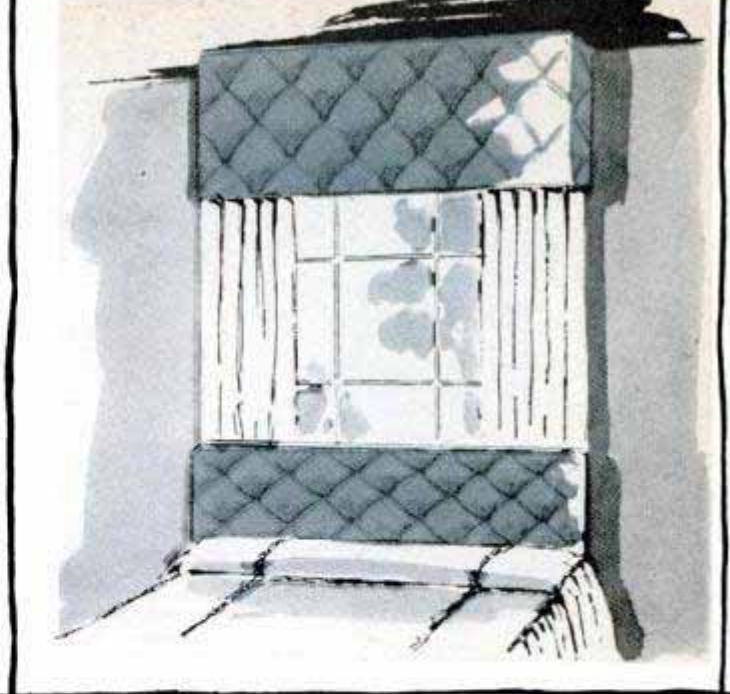
Smart cornices in vogue today often extend from window to ceiling, and many are covered with fabric to match or contrast with the draperies, furniture coverings or other room appointments. Other cornices are wallpapered, painted or covered with plastic fabric. The dominant period motif of the furniture often can be followed in the shape and design of the cornice. To relieve large unbroken window areas, cornices



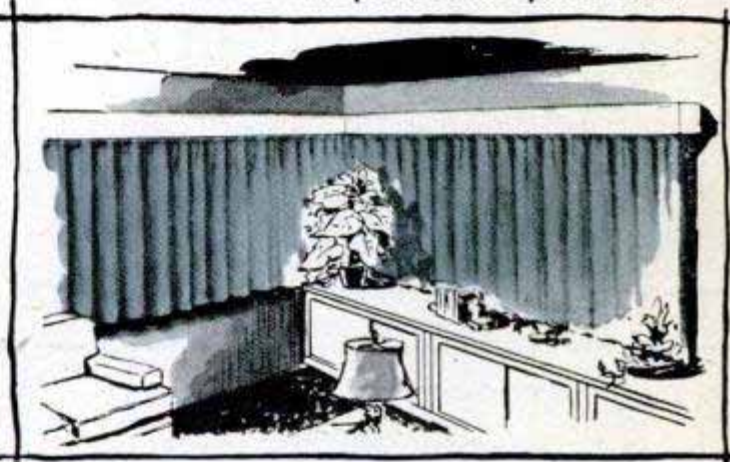
sometimes are extended down both sides of the window, either to the sill or the floor. Instead of using separate cornices over the windows of a bay, you frequently can use one for the entire span, achieving a pleasing alcove effect.

But the use of cornices is not limited to the living-room and dining-room areas. They have applications throughout the house. In the kitchen, a cornice over the range can be used to conceal the exhaust fan and also may provide a mounting board for a kitchen clock. Cornices in a bedroom, in addition to being used over the windows, can dress up a bed alcove or a dressing-room entrance and add a feeling of real luxury to the room. Where a bed with an upholstered headboard is used, an interesting effect is obtained by upholstering the cornice to match the headboard. Often the appearance of a bathroom can be improved with a cornice that hides the shower-curtain rod, in which case the cornice is made of hardboard so that it will not warp due to steam from the shower. Awning-type cornices installed over real or dummy windows in the basement playroom are unusual and cheerful. They can be supported on a hardboard backing or hung on a heavy wire frame like exterior awnings. Gay red-and-white striped patterns are the most popular for this use.

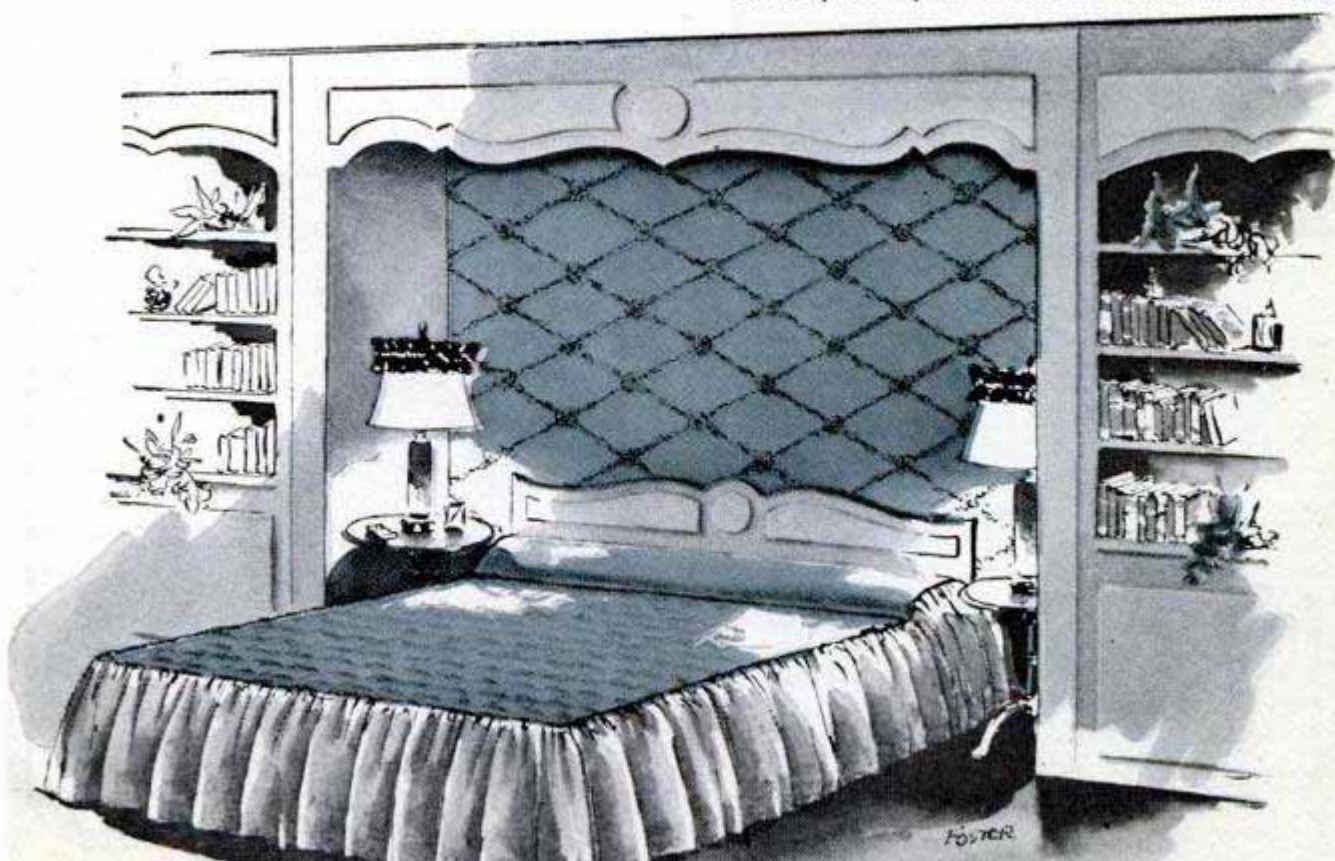
Other places around the house where cornices of various types can be employed with good effect are over bookshelves and across archways between rooms. Interesting illuminating effects can be produced by incorporating fluorescent lamps in cornices. Depending on the way in which the lamp is mounted, you can get direct downward

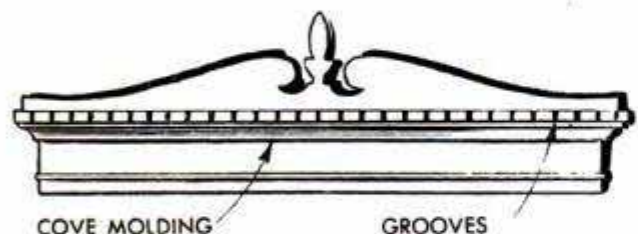
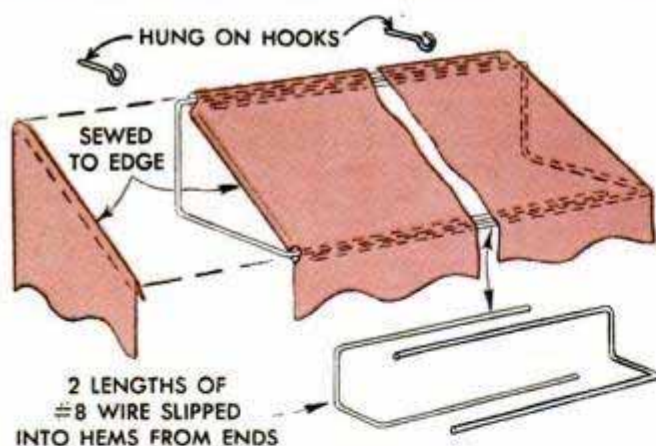
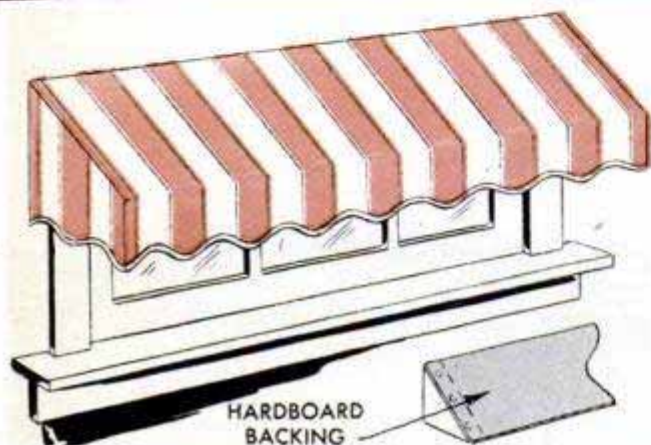


Bedroom-window cornice, above, is upholstered with same material as bed headboard. Cotton padding tufted with furniture nails produces the quilted effect



Long, narrow window cornices, above, serve a dual purpose when used to conceal fluorescent lamps for indirect lighting. Cornices over alcove and bookshelves, below, are scrolled to match bed headboard



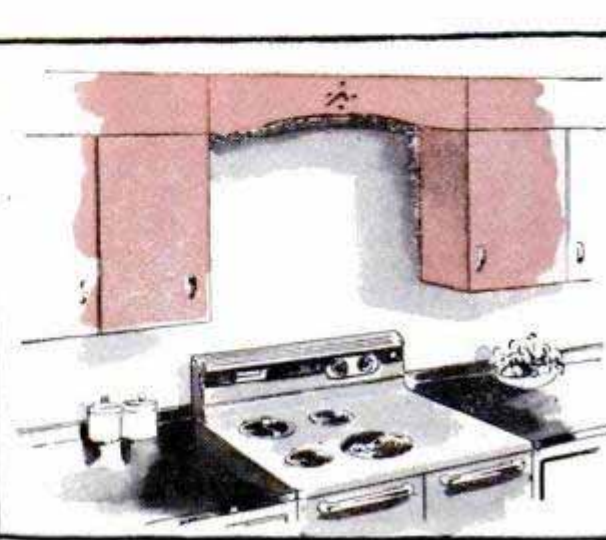


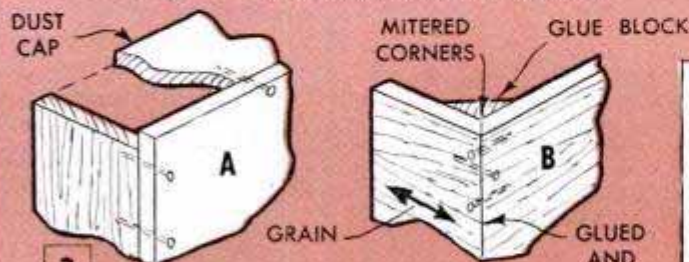
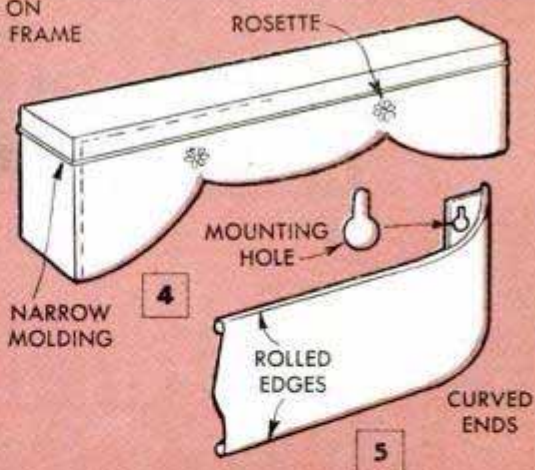
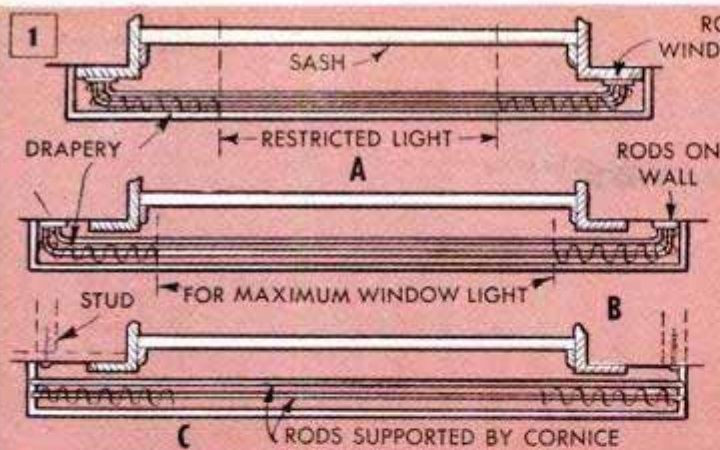
illumination or indirect ceiling light.

In designing cornices for your windows, here are some things to remember. Wooden cornices, if long and wide, often require scrolled breaks or curves to produce more pleasing effects (see Fig. 6). To soften the severity of lines or to "lighten" plain cornices, a cloth flounce is sometimes tacked to the lower edge. Narrow molding and rosettes, Fig. 5, often can be used to improve the appearance of a cornice. Instead of ending a cornice at each side of a window, you can get full light from the window by extending the cornice and draperies from 6 to 12 in. beyond the edges of the window if wall space permits. Cornices may be hung over curtain and drapery rods that are attached to the wall, or they can be built to include the rods, as shown in Figs. 1 and 2 on page 177. Cornices that support considerable weight must be of adequate strength and must be securely attached to the wall, preferably to the studs. The location of the studs may be a factor in determining the length of the cornices. If they must be fastened to the wall between stud locations, use screw anchors that spread behind the plaster, Fig. 3. Shelf brackets with ends bent upward to fit into a slot in the cornice, detail A, will provide adequate support for a heavy cornice if they are fastened securely to the studs. Other methods of mounting cornices are shown in Figs. 3 and 7.

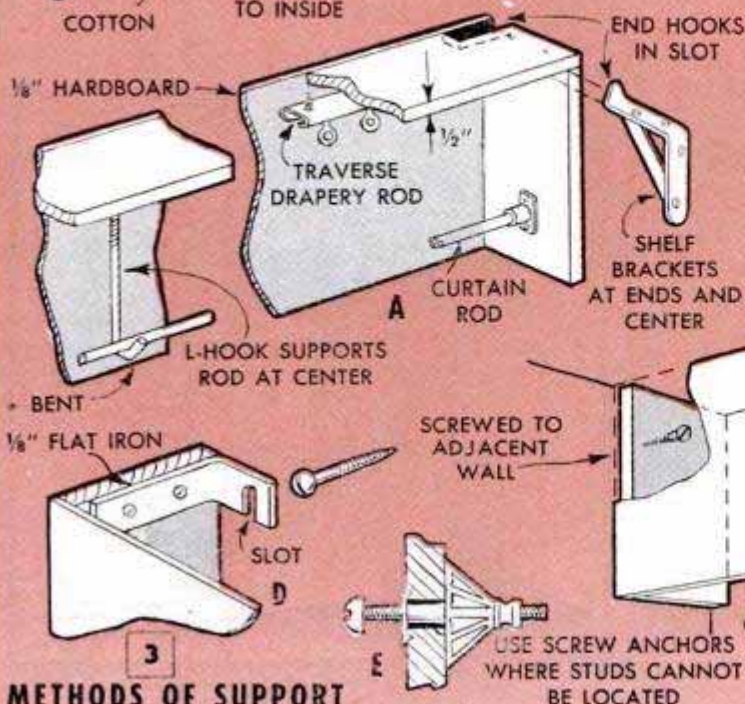
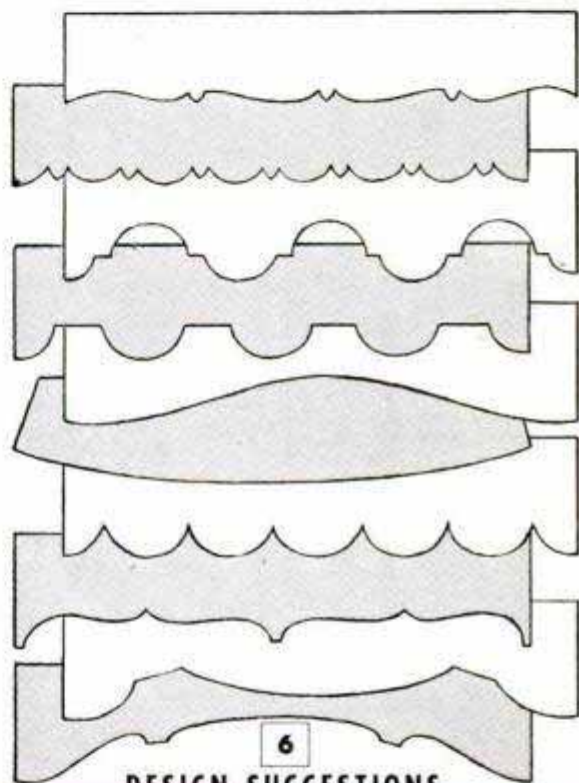
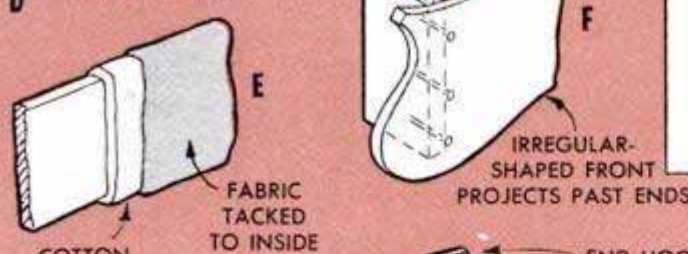
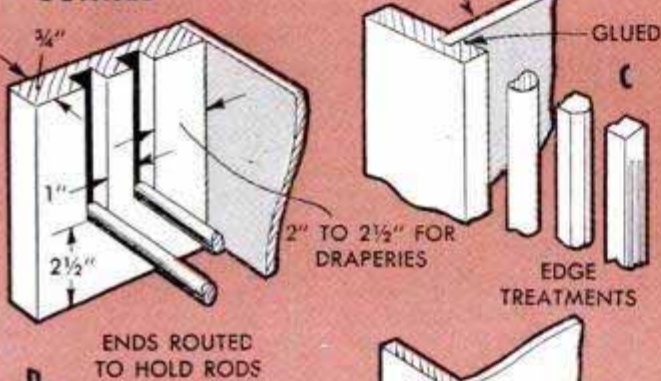
Lumber, plywood and hardboard lend themselves best to the making of cornices by the average homeowner. However, sheet metal also can be used, as in Fig. 5, in which case you should have a tinsmith roll the top and bottom edges to obtain greater rigidity and to eliminate sharpness.

When making cornices to be painted or otherwise covered, simply nail the front to the ends as in Fig. 2, A, the grain of the endpieces running vertically. Use crack filler on the end-grain and to plug nail holes, sand it down flush when dry. When cornices are long and narrow, and also when

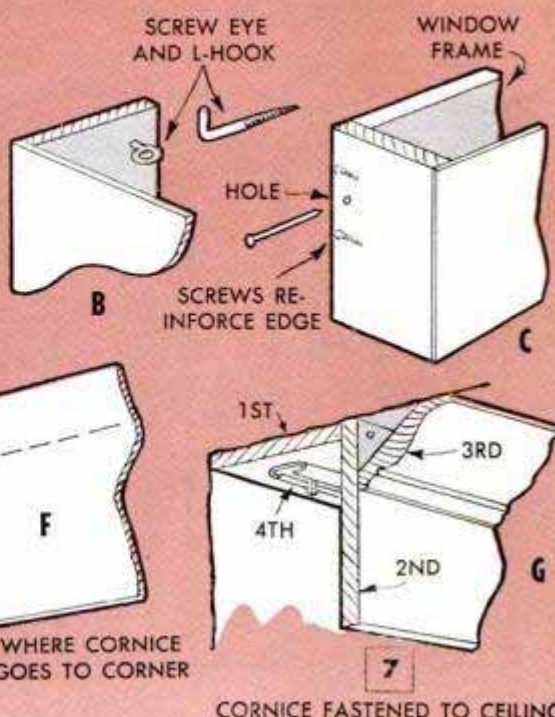


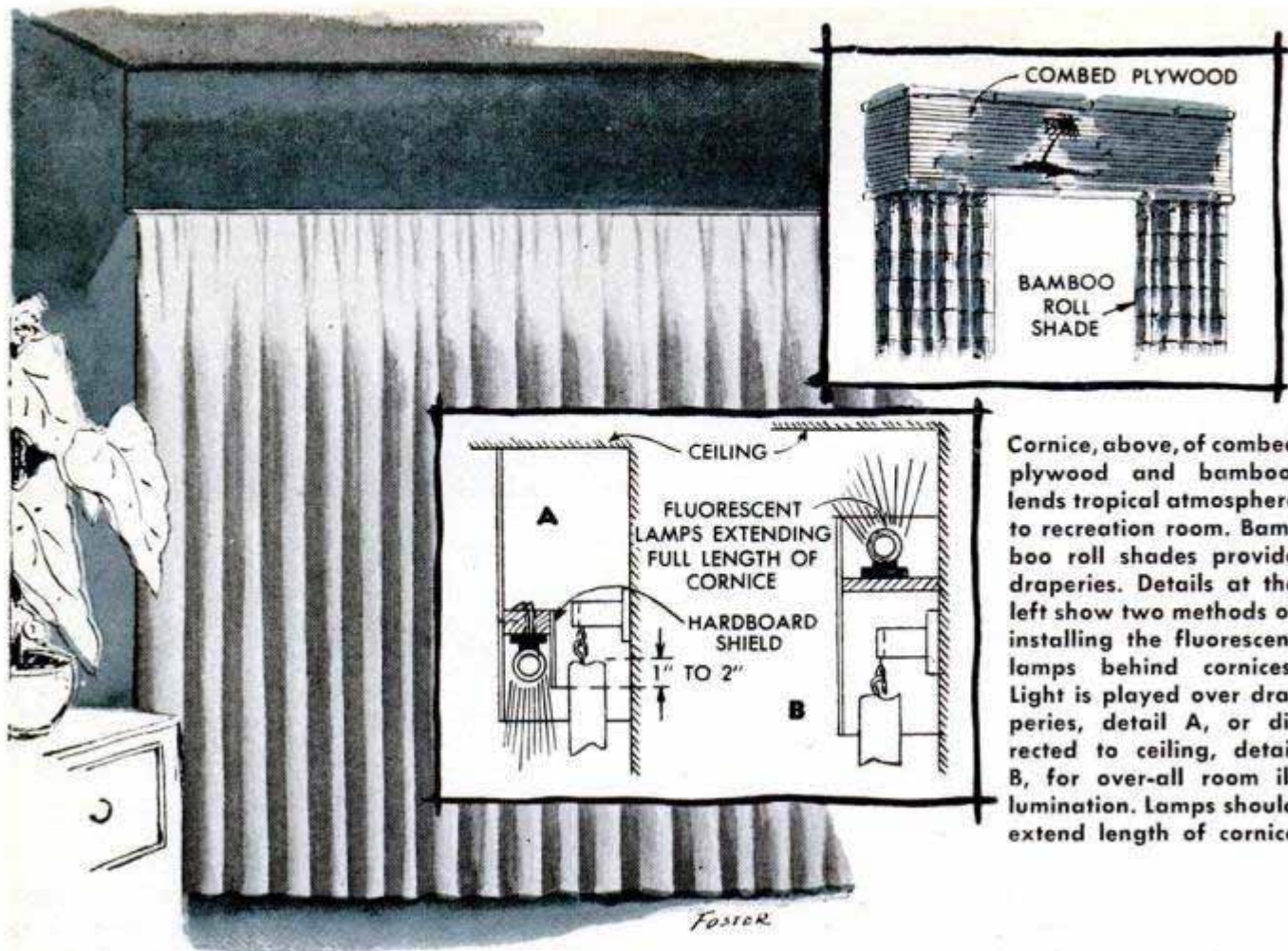


ASSEMBLY DETAILS



METHODS OF SUPPORT

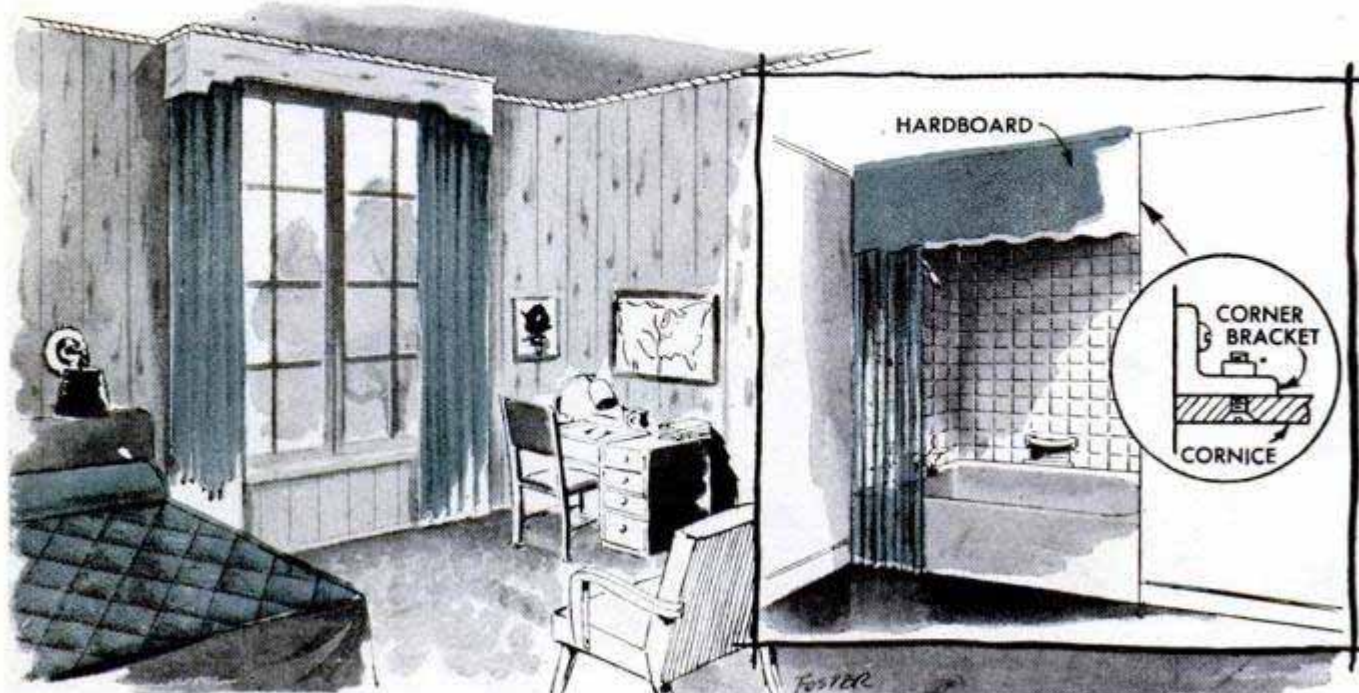




Cornice, above, of combed plywood and bamboo, lends tropical atmosphere to recreation room. Bamboo roll shades provide draperies. Details at the left show two methods of installing the fluorescent lamps behind cornices. Light is played over draperies, detail A, or directed to ceiling, detail B, for over-all room illumination. Lamps should extend length of cornice

light plywood or hardboard is used for the face, greater rigidity is obtained by adding a dust cap across the top. If cornices are to be stained or finished in a natural color or made of combed plywood, the grain direction of the endpieces should match that of the frontpiece, and the corners should be mitered, glued and nailed, detail B. Another method of assembly is to glue the front into grooves cut in the endpieces. However, the ends become more pro-

nounced in this type of construction. For holding two plain curtain rods in a relatively short cornice, the endpieces can be routed, Fig. 2, D, or slotted with a saw, the lower portion being closed with plugs. On curved or irregular-shaped cornices, the front may have to project past the ends as in detail F. When covering a cornice for an upholstered or quilted effect, use cotton upholstery padding before applying the covering material as in detail E. ★ ★ ★



Handy Data Plate Assures Sharp Photos at Fast Action

To assure over-all sharpness in shooting fast action when there is not time for direct focusing, stamp the data pertaining to the hyperfocal distances of your camera lens on a plate and mount it on the camera in a position where it can be seen at a glance. The hyperfocal distance data may be obtained from the manufacturer. The plate shown in the photo covers hyperfocal distances for a 5¼ and a 7¼-in. lens, with distances for each stop opening being given from f:4.5 to f:45. As an example of how it works, the hyperfocal distance for a 5¼-in. lens at f:11 is 40 ft., which means that everything within approximately half that distance, or 20 ft., is in reasonably sharp focus. Thus, where there is not enough time for focusing, and with the lens aperture at f:11, the photographer can quickly estimate the distance by referring to the data on the scale.

Clinton R. Hull, Costa Mesa, Calif.



Lens Shade and Dust Cover Made From Aspirin Can

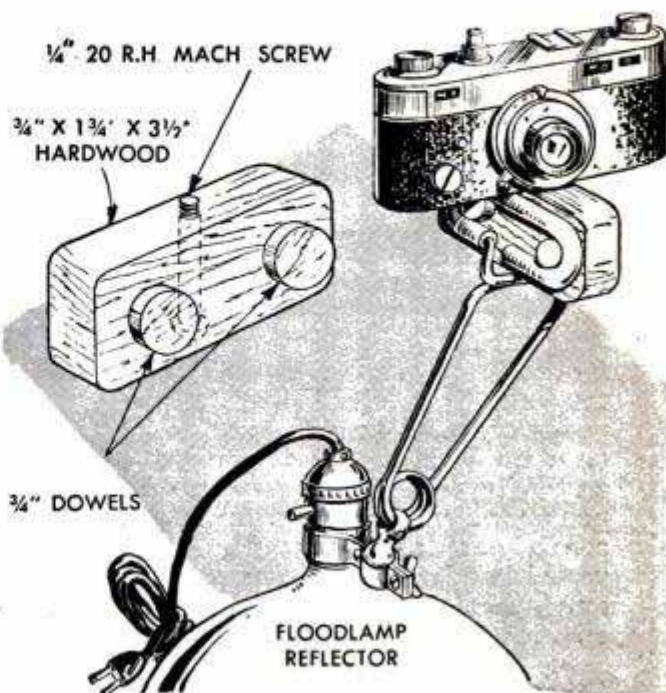


Two problems that ordinarily confront camera owners were overcome by a photographer who uses a small can of the type having a hinged cover to provide an adjustable sunshade, and also a handy dust cover for the lens of his camera. The can, which may be either of two similar types used as containers for aspirin and cold tablets, is cut on the bottom so it will press-fit over the lens mount in the manner shown, after which the inside surfaces are painted flat black.

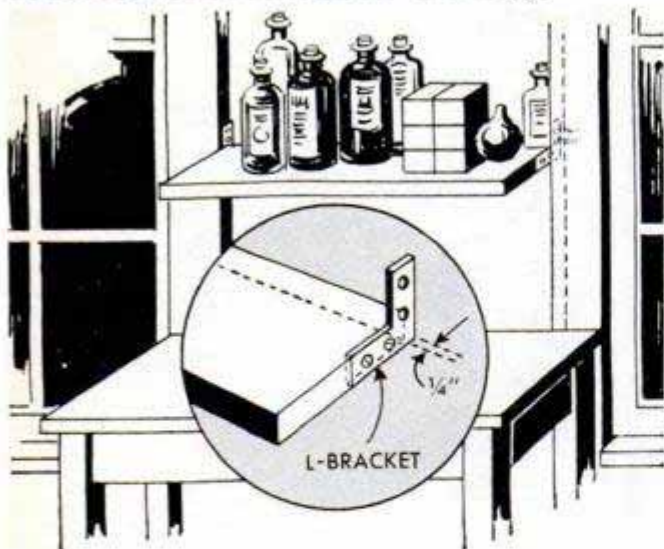
Clamp-On Photoflood Reflector Makes Table-Top Tripod

Did you ever consider utilizing a spare clamp-on photoflood reflector as a table-top tripod? Such a reflector will prove ideal for supporting a candid-type camera, since the swivel joint on which the clamps are mounted permits universal adjustment, while the reflector itself provides a non-tipping base. Naturally, the distance the camera may be tilted forward and sideways will be determined by weight of the camera as well as the diameter of the reflector. All that is required to mount the camera in this manner is a special wooden adapter which is made from a small hardwood block. The block is fitted with a ¼-20 machine screw to hold the camera, and is drilled to take two short lengths of ¾-in. dowel as shown. These project sufficiently on both sides of the adapter to engage the rubber-covered jaws of the reflector clamp and assure a positive grip.

Arthur Trauffer, McClelland, Iowa.



Shelf Supported by L-Brackets Attached to Window Casings



To install a shelf for photo supplies without marring the wallpaper in an apartment darkroom, one amateur photographer attached the ends of the shelf to the sides of two window casings with L-brackets. These are positioned to project slightly from the rear edge of the shelf to allow a small space between the shelf and wall.

Hands Dipped in Photo Chemicals Won't Become Stained

To prevent your hands from becoming stained by photo developer, simply dip them, along with the prints, in each of the various stages of photo development. When

a print is fully developed, and you dip it in the acid shortstop, be sure to immerse your hands in the solution at the same time. Then, when the print is taken from the shortstop and placed in the hypo solution, immerse the hands in the hypo. The final step simply is to rinse them in the wash water and dry them on a towel. By following this procedure, any developer on the hands will at first be weakened by the shortstop and then fully removed by the hypo, after which the latter can be rinsed off easily. This treatment will leave the hands completely free of chemicals by the time they are ready for drying, thus eliminating the possibility of staining the towel.

Card File Box Stores Varigam Filters

An ordinary wooden file box is an ideal storage cabinet for Varigam filters. When filed in it, the numbers of the filters show plainly for easy selection and are picked up with a minimum of fumbling. The

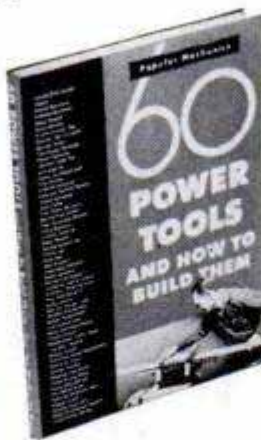


wooden type of box is better than a metal one for this purpose because the sharp corners of the metal box may scratch the filters.—Robert C. Florian, Chicago.

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SHOP NOTES

CLEAN PLUGS spark your car

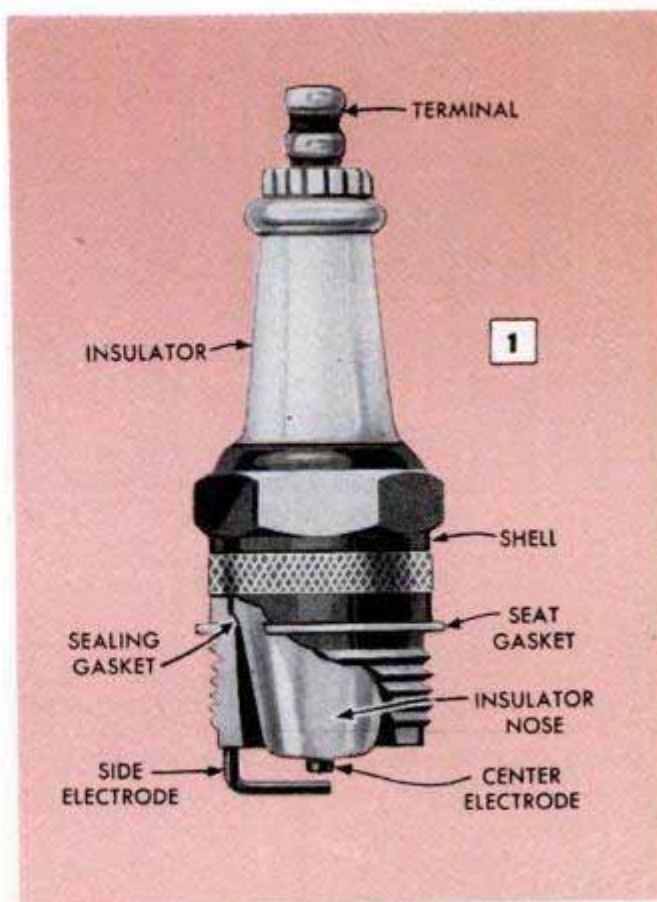
By Ed Packer

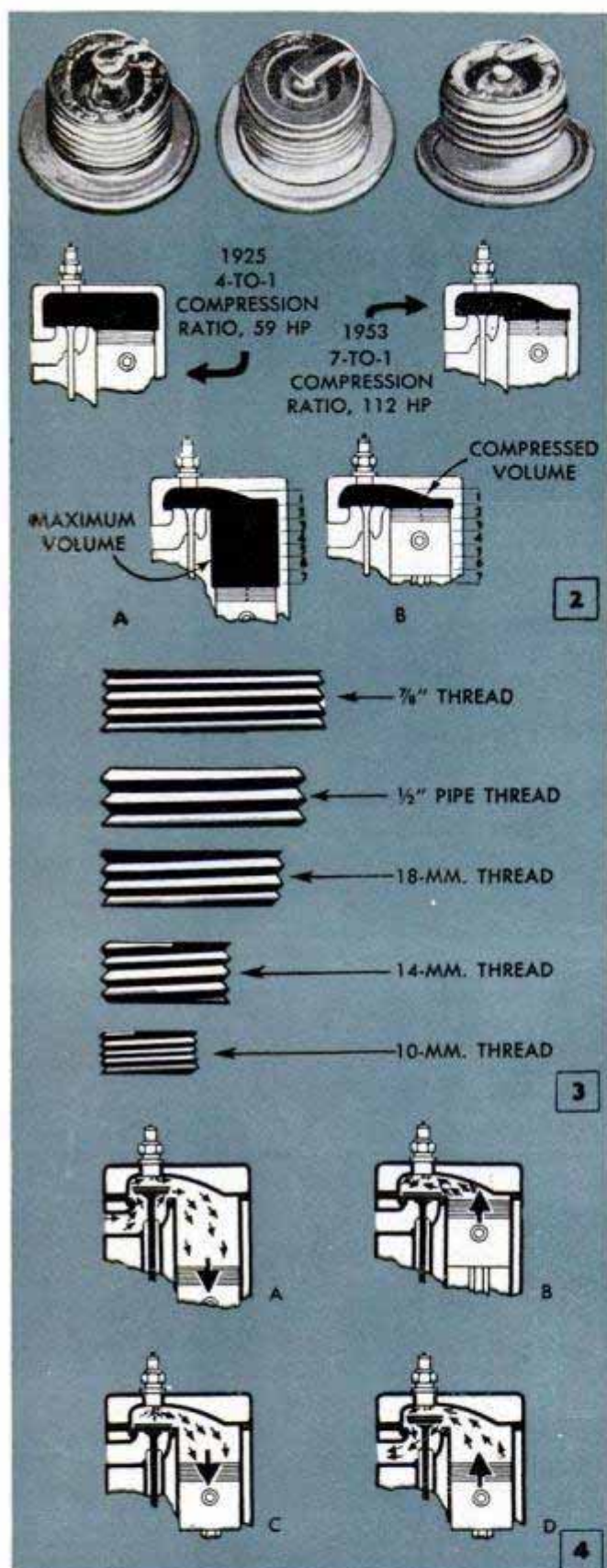
ALTHOUGH ALL OTHER PARTS of an auto engine contribute their fair share to the power cycle, the spark plugs trigger the whole process of converting fuel-air mixtures into horsepower. No other part of the engine is subjected to such extremes of temperature. Each plug must hold under pressures that range up to 500 lb. per sq. in. The plugs are insulators for electrical surges that can reach 25,000 volts, the actual voltage varying with the electrode gap and the compression through which the spark must jump.

When in position, the electrode end of the plug, Fig. 1, is a part of the combustion chamber. Because of its position at the top end of the cylinder, an experienced mechanic can look at the end of a plug that's been in service and learn nearly everything he needs to know about the mechanical condition of the cylinder from which the plug was taken. The three upper photos in Fig. 2 show what he looks for and how he judges the condition of the engine in general by the appearance of the plugs. The plug nose on the left is fouled with encrusted hard carbon. The mechanic knows at a glance that this plug is from an old engine, probably an oil pumper. He also knows, without seeing the engine, that it will do little good to clean the plug. If he recommends a ring job, it'll pay to have it done. One look at the center plug in Fig. 2 and your mechanic will screw it back into the head. He won't even bother to clean it for he knows that it's delivering peak performance and the less it's tampered with, the better. But he may lift an eyebrow when he examines plugs from your car that look like the one on the right. He will guess that you're a fast, hard driver on long cross-country runs and that the fuel mixture is "leaned out" until you're practically burning air. The insulator nose, Fig. 1, is white and the electrodes are rather badly eroded. But your mechanic won't stop there. He'll think of several other possibilities and go over each in turn. For example, it could be



Spark-plug reading tells a good auto mechanic just about everything he needs to know about the condition of each cylinder without even checking the engine





TORQUE-WRENCH READINGS		
THREAD SIZE	CAST-IRON HEAD	ALUMINUM HEAD
10 MM.	14	12
14 MM.	30	28
18 MM.	34	32
7/8 - 18	37	35

It's important to tighten plugs to a uniform tension when replacing. Note variation in the readings for the different plug sizes and types of cylinder heads

that the fuel pump fails to deliver sufficient fuel at high engine speeds. If he discovers two plugs with burned electrodes and the others appear to be normal, he'll guess right away that there's a leak in the manifold. Probably he'll be right. Give him time to fix the leak and then have him install new plugs and readjust the carburetor. It'll pay well in the long run.

The center details in Fig. 2 show graphically how compression ratios and horsepower have been increased since 1925. Present-day car owners are getting almost twice the power from an engine that takes less space under the hood than did the 1925 model. These design changes increased the load on the spark plugs as will be noted from details A and B in Fig. 2. When the maximum volume in detail A is compressed into the space shown in detail B, the spark-plug gaskets must withstand greatly increased pressures. The plug structure must insulate electrical energy sufficient to force the current to jump the electrode gap in the midst of the highly compressed fuel charge. As engine pressures increased, it became necessary to redesign the plug and reduce its size, Fig. 3, in order to minimize the tendency to leakage and increase the ability of the plug to dissipate heat.

Several things happen in a four-cycle engine, both during and between the cycles, Fig. 4, which directly affect spark-plug performance. In detail A, Fig. 4, the incoming charge passes across the plug electrodes and cools them. Then comes the compression stroke, detail B, the power stroke after the charge has been fired, de-

TROUBLE SHOOTING 5

OCCASIONAL MISS AT HIGH SPEED

SPARK-PLUG GAPS TOO WIDE.
WEAK COIL OR CONDENSER.
POOR CARBURETION
WEAK SPRING ON BREAKER POINTS.
BREAKER POINTS IMPROPERLY ADJUSTED.
OVERHEATED SPARK PLUGS.

MISSING UNDER SLOW, HARD PULL

WEAK COIL
SPARK ADVANCED TOO FAR.
PLUG GAPS TOO WIDE
FOULED PLUGS
DEFECTIVE IGNITION CABLE.
DEFECTIVE BREAKER POINTS.

ENGINE KNOCKS BADLY

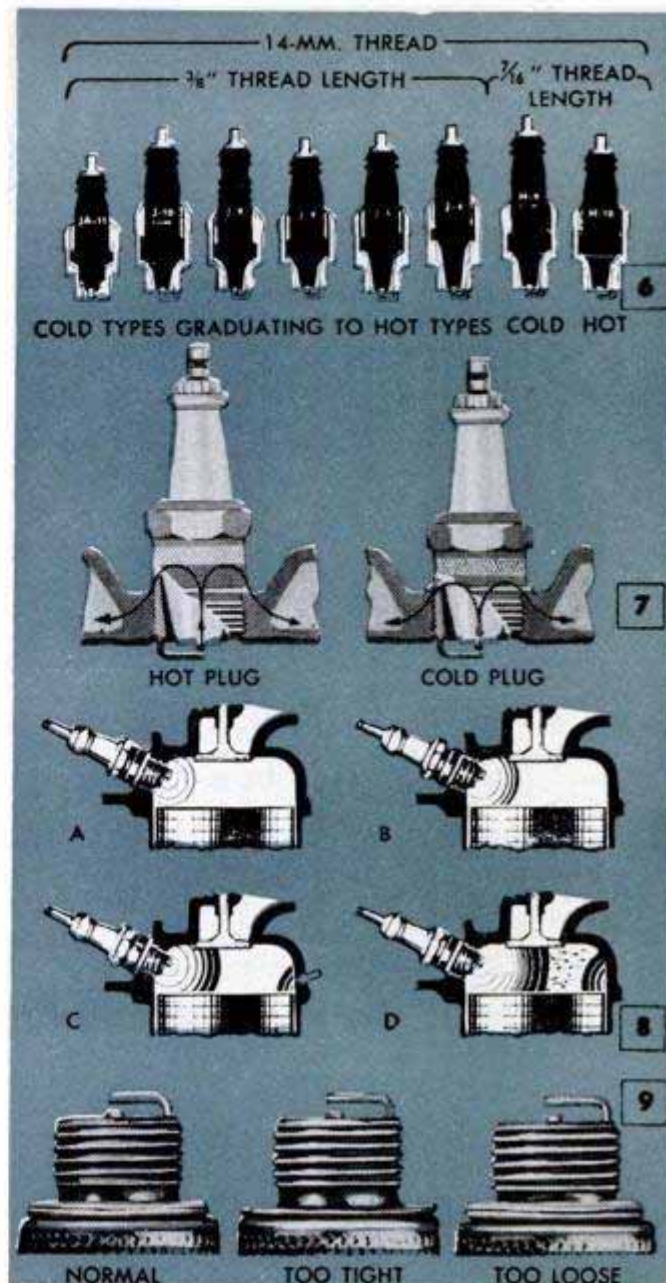
FUEL ANTIKNOCK VALUE TOO LOW.
SPARK ADVANCED TOO FAR.
FUEL-AIR MIXTURE TOO LEAN.
OVERHEATED ENGINE
EXCESSIVE COMBUSTION-CHAMBER DEPOSITS.
SPARK PLUGS OVERHEATED.

ENGINE WILL NOT IDLE

CARBURETOR CLOGGED
SPARK-PLUG POINTS TOO CLOSE.
LEAKING CARBURETOR OR MANIFOLD GASKETS.
IMPROPER CARBURETOR IDLING ADJUSTMENT.
STICKING VALVES
WEAK COIL OR CONDENSER.
FOULED PLUGS

tail C, and finally the exhaust stroke, detail D. Obviously the hottest part of the plug is the center electrode. Heat dissipates through the center electrode to the cylinder head from which it transfers to the coolant, either water or antifreeze solution. From this it follows that the longer the electrode, the hotter the plug, Figs. 6 and 7. This is why your mechanic generally will recommend cold plugs for cross-country driving at high speeds and hot plugs for stop-and-go driving on city streets and under certain winter-driving conditions. The hot plug, having a longer electrode, operates at a higher temperature and is, in a sense, self-cleaning. On the other hand, the cold plug operates at a relatively lower temperature due to faster heat dissipation and is suited to sustained high-speed driving. Note also, Figs. 6 and 7, the variations in the thread lengths of the two types. The hot plugs generally have longer threads so that the shell extends slightly into the combustion chamber.

Use of the wrong plug in your car may cause pinging or detonation. Defined in a simple way, detonation is a secondary ignition or explosion, Fig. 8. Hot plugs may become overheated to such an extent that the electrodes become red hot. The red-hot points preignite the fuel charge while the piston is in the compression stroke. The excessive pressure which develops causes a secondary ignition at the opposite side of the combustion chamber. This results in a proportionately violent explosion which is very destructive to engine parts if not corrected. The usual progress of detonation, or ping, is shown in details A, B, C and D in Fig. 8. The effect is very much the same as if the spark were occurring too early in the compression stroke. It should be kept in mind, of course, that incandescent carbon fringes, the overheated edge of a cylinder-head gasket or a knife-edge valve can cause similar symptoms. Hot spots in the cylinder head due to clogged water passages are also a source of trouble of this kind. There are other causes, of course, but those outlined are the most common.



Plug gaskets are of the compression type and when drawn to the normal tension form a perfect seal. Excessive torque compresses the gasket beyond the normal range and destroys the seal, Fig. 9. Leaks at the plugs can affect engine operation in a manner similar to some of the other possible causes given in the trouble-shooting tables, Figs. 5 and 10, where common spark-plug defects are listed. ★ ★ ★

Certain details courtesy Black & Decker Mfg. Co., Socony-Vacuum Oil Co., and Champion Spark Plug Co.

TROUBLE SHOOTING 10

HARD STARTING

WEAK BATTERY
MOISTURE ON PLUGS OR
IN DISTRIBUTOR.
FAULTY BATTERY CABLE
OR GROUND CONNECTION.
WEAK COIL OR
CONDENSER.
PLUG POINTS WORN,
PITTED OR BADLY FOULED.
CARBURETOR NEEDS
CLEANING.

ENGINE OVERHEATS

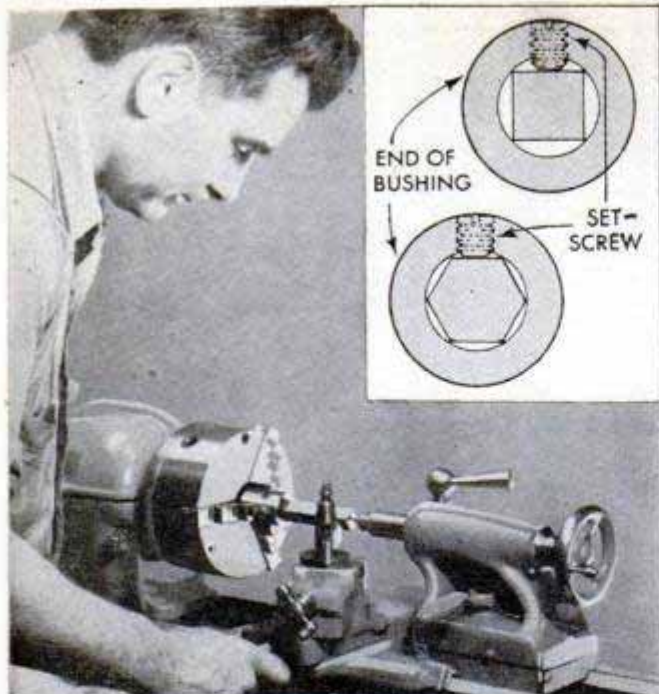
FUEL-AIR MIXTURE
TOO LEAN.
IMPROPER IGNITION
TIMING.
CLOGGED COOLING
SYSTEM.
EXCESSIVE COMBUSTION-
CHAMBER DEPOSITS.
SLIPPING FAN BELT
INSUFFICIENT OIL
CIRCULATION.

ENGINE BACKFIRES

AIR-FUEL MIXTURE
TOO LEAN.
IMPROPER TIMING
INTAKE VALVE STICKING

ENGINE OPERATION ERRATIC

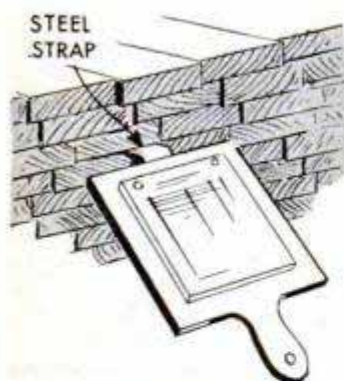
LEAKS IN CARBURETOR
OR MANIFOLD GASKETS.
IMPROPER FUEL-AIR
MIXTURE.
FUEL TANK NEARLY
EMPTY.
LOOSE IGNITION WIRES
WATER IN FUEL
FAULTY CHOKE CONTROL



Drilled Bushing in 3-Jaw Chuck Holds Bar Stock for Machining

When a 4-jaw chuck is not available, square bar stock can be turned in a 3-jaw chuck if it is first mounted in the end of a steel bushing. The bushing is rebored, if necessary, to take the work as a snug push-fit, and then cross-drilled and tapped for a setscrew which keeps the work from slipping while being machined. This method also can be used for turning hexagon stock in a 4-jaw chuck when no 3-jaw chuck is available.—F. Shelford, Los Angeles, Calif.

Self-Supporting Tally Board Speeds Lumber Inventory

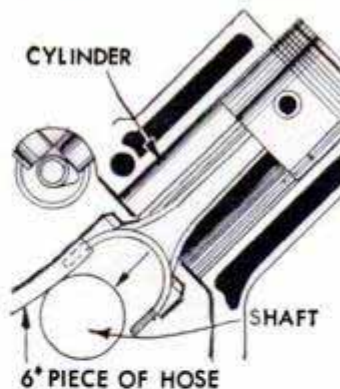


In order to have both hands free when taking inventories or checking orders in a lumberyard, make a tally board that will anchor in the lumber pile. The board is made by cutting a paddle of the type shown from plywood and bolting a length of flat steel to the square end. The steel holder is bent to support the paddle at the proper angle for writing when inserted between layers of lumber.

¶To prevent tools from dropping into a well accidentally when replacing or raising pipe sections for repair, one worker slips a harrow disk over the end of the pipe to provide a cover for the pump opening in the well platform.

Hose Simplifies Replacement Of V-8 Engine Pistons

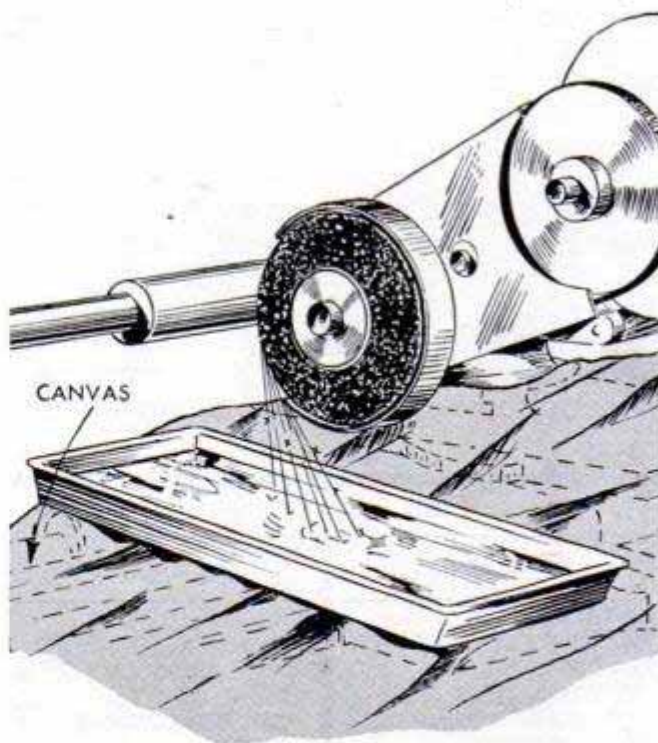
To prevent a piston-and-rod assembly from slipping down alongside the crankshaft when replacing it in a V-8 engine, slip a 12 in. length of stiff-rubber hose over one of the connecting-rod bolts so that it rests on top of the crankshaft. Then, as the piston is pushed into the cylinder, the hose will guide the rod bearing into place on the shaft.



Canvas Covering Under Grinder Protects Lathe From Abrasives

The versatile tool-post grinder, when used for numerous grinding and sharpening operations, creates a large amount of abrasive dust and grit that could easily prove harmful to working parts of the lathe itself. For this reason, the lathe-bed ways and the headstock bearings should be protected by covering them with canvas or heavy paper. It is also advisable to place a shallow pan containing oil or water directly beneath the grinding wheel to collect most of the abrasive particles as the grinding takes place.

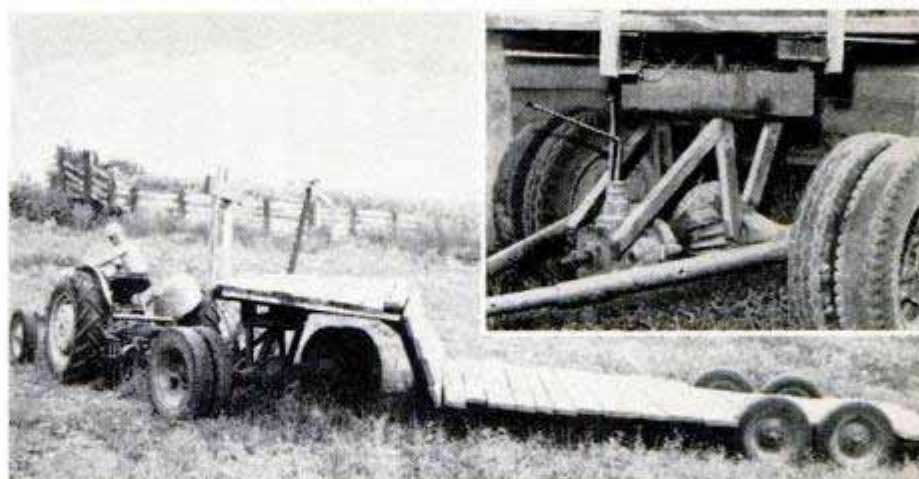
C. W. Woodson, Chicago.



¶If available, a currycomb may be used as a trowel for rough-surfacing concrete floors, driveways and sidewalks to provide more traction when wet.

Needing a special trailer for moving heavy loads in soft fields, one farmer designed and built this unit. The front section of the bedframe is offset vertically to provide turning space for a dual-wheeled truck axle, the latter driven from the tractor power take-off. The truck drive shaft is cut off and the regular truck transmission mounted on an angle-steel bracket just ahead of the differential. A short bolster and fifth wheel permit the axle to swing wagon-fashion for a short-radius turn. The forward end of the offset bedframe is mounted on the bolster and swivels on a kingpin. Trailing dual wheels carry the rear of the bedframe as illustrated. The frame is 24 ft. long, 16 ft. to the rise of the offset, and 7½ ft. wide over the plank bed. It is made from welded steel-channel side members X-braced with steel angles. The offset is reinforced with heavy

Booster Axle Driven by Tractor Take-Off Provides Extra Power for Farm Trailer



flat-steel gussets. All corners are reinforced with gusset plates. In use, it is necessary to "synchronize" the booster-axle transmission with the power take-off so that the trailer does not "climb" or "drag." This can be done by shifting the trailer transmission to a suitable speed and then throttling the tractor engine to suit.

A. M. Wettach, Mt. Pleasant, Iowa.

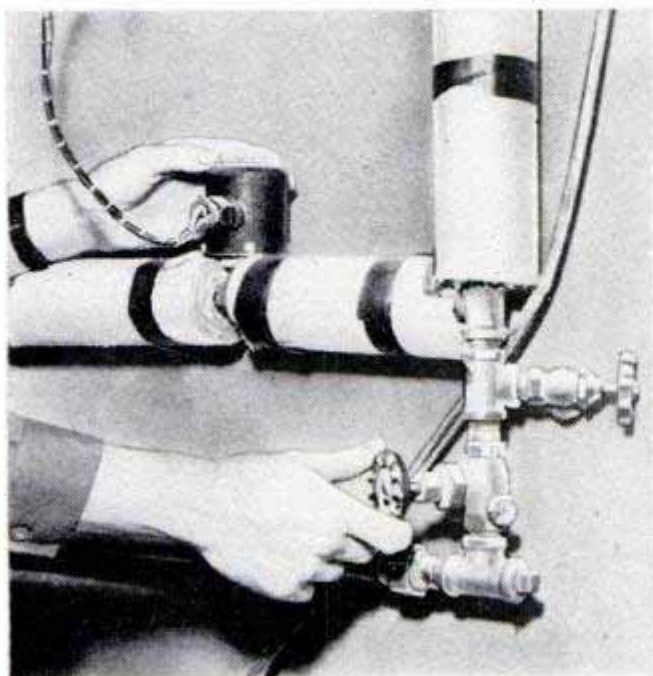
Carbon Removed From Car Motor With Hydrogen Peroxide

See letter in back of book

To remove carbon from the motor of his car, one motorist disconnected the rubber tubing from the windshield wiper and inserted the end in a bottle of hydrogen peroxide. Next, he started the motor, causing the peroxide to be drawn through the tubing into the intake manifold, and then into the cylinders. Here, due to the supercharge of oxygen it contains, the peroxide in most cases burns out any carbon in the

cylinders. If the tubing is inaccessible at the wiper, it can be disconnected from the copper tubing leading into the manifold. Extra tubing will be needed for this, in which case one end is slipped over the copper tubing and the other inserted in the bottle of peroxide. Another way is to introduce the peroxide through the air intake, pouring it so a trickle no thicker than a pencil lead enters the unit.

Solenoid Valve in Water Line Controls Flow to Poultry Waterers



To assure an adequate supply of fresh water for his flocks in the early morning and evening during the winter laying season, one poultryman installed a time-controlled solenoid valve in the pipe line for carrying water to float-equipped fountains. The solenoid valve is wired into the time-clock circuit so that it is opened when the clock turns on the lights in the early morning and closed when the clock turns off the lights in the evening. The setup requires no attention throughout the day other than a periodic cleaning and inspection of the watering fountains. The lower pipe and shutoff valve in the photo were installed as an emergency bypass in case of a prolonged power failure. Also, the pipes were covered with a hot-water-pipe insulating material as a precaution against freezing during extremely cold weather. — Eleanor Gilman, Middletown Springs, Vt.

SHOPPING FOR TOOLS

1. ELECTRIC SCREWDRIVER and nut runner drives small free-turning screws and runs nuts without stripping threads. Light weight and easy maneuverability reduce operator fatigue and increase production as much as five times over comparable handwork. Adjustable clutch provides for running screws and nuts to specified tensions. Wrenches and drivers are held in chuck by spring-ball plunger which grips securely

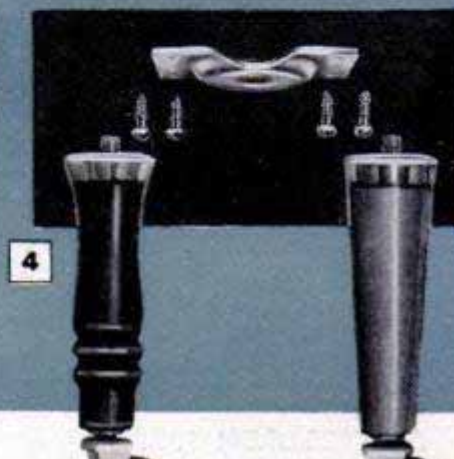
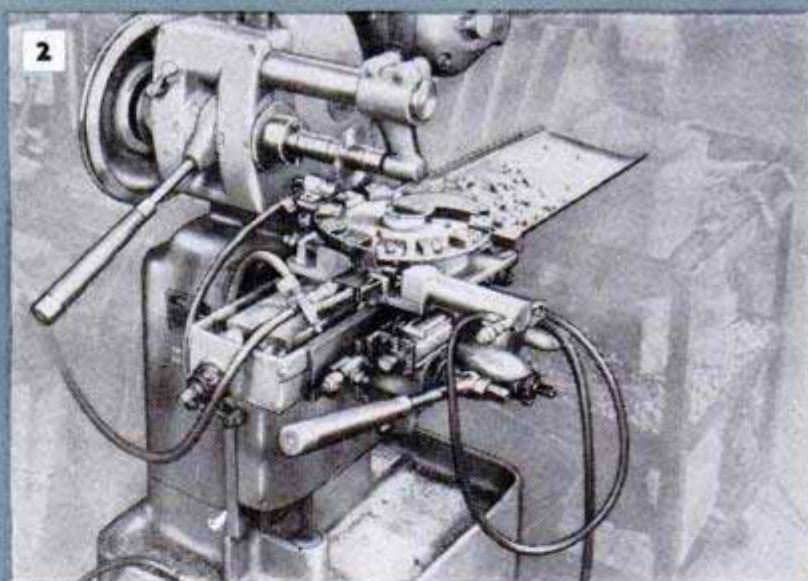
2. AIR-DRIVEN ROTARY WORKTABLE for small milling machine provides semiautomatic operating sequence for fast duplicate work on small parts. Workpiece is fed by rotary carrier which grips the parts as it passes under cutter. Machine table is then returned manually to starting position. Cam then ejects the finished piece. Table indexes to the next position, operator places workpiece in holder and cycle repeats

3. PLASTERER'S DARBY is made of lightweight aluminum alloy and comes in four sizes ranging from 36 to 58 in. in length. Sectional shape is designed to permit an easy grip along the entire length without separate handles and by simply inclining the blade at varying angles, the operator can obtain a rough, medium or smooth finish. Cuts clean, sharp angles in corners without pulling plaster away from the lath

4. HOLLYWOOD-BED LEGS are designed for attaching to box springs with wooden frames and also to angle-steel bedframes. Available with or without swivel casters. Legs are turned from hardwood and are finished dark or light to match varying styles of headboards. For attaching to wooden frames, leg is supplied with a metal anchor plate which is tapped for a stud fitted in a metal cap locked to top end of leg

5. CALKING-COMPOUND CONTAINER is fitted with a special follower which makes it a self-contained "gun." Designed especially for those who have only occasional calking jobs, the follower permits use of a hammer handle as a plunger for forcing compound out through nozzle as pictured. Compound is contained in a collapsible tube mounted inside the cartridge. This construction prevents leakage past the follower

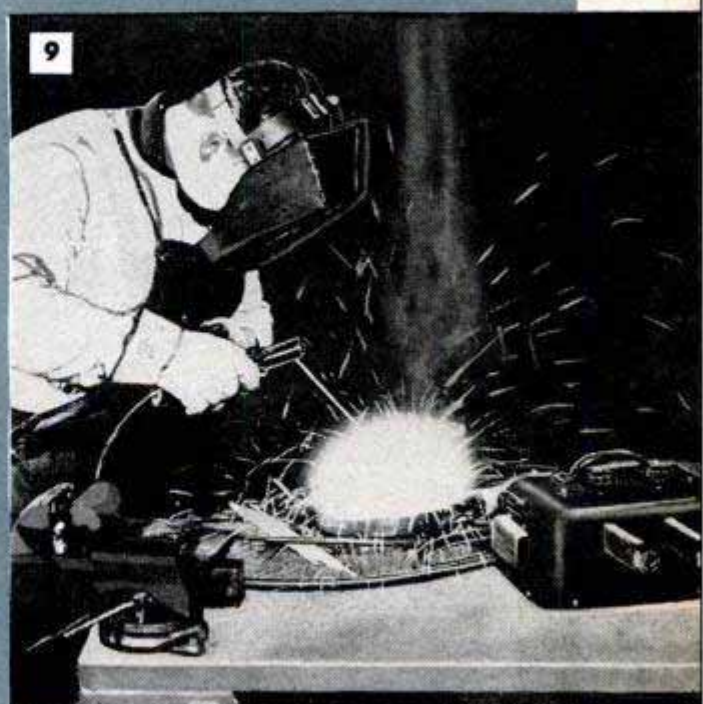
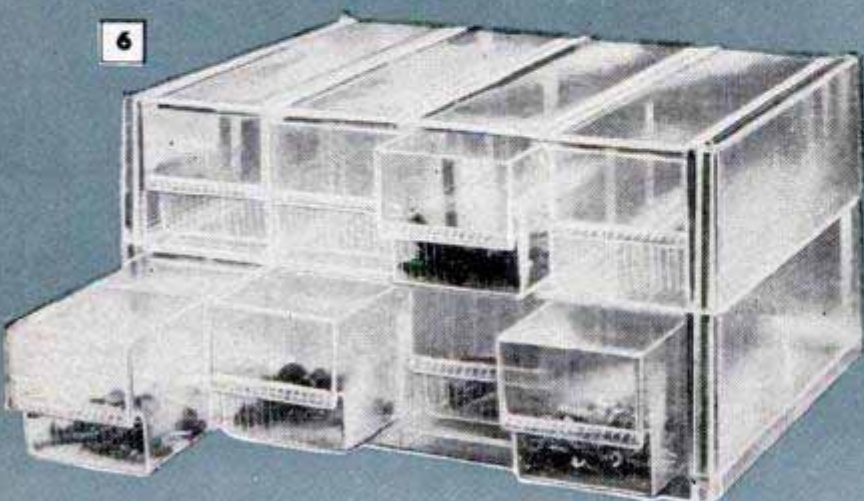
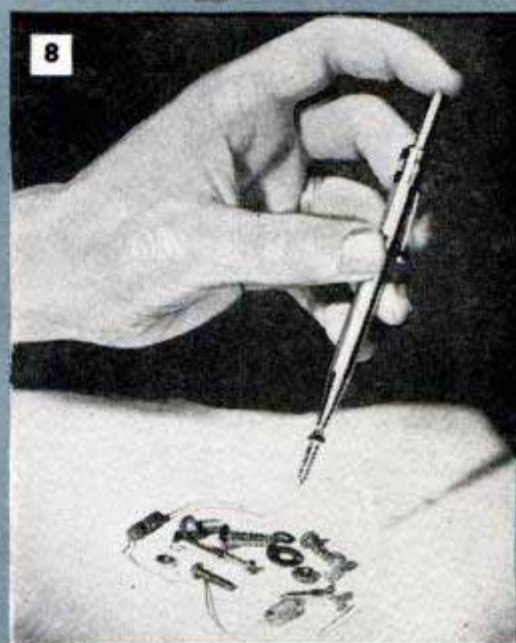
6. SMALL-PARTS STORAGE CABINET is made entirely of transparent plastic so that entire contents of each drawer can be seen at a glance from the sides, front or top. This makes the unit especially suited to counter-top display as well as shop storage of small parts. Units can be stacked to provide any number of drawers required. Clear-plastic dividers are available for each separate drawer for selective storage



7. FERTILIZER-SPREADER ATTACHMENT is designed to fit on any conventional hand-powered lawn mower for precision spreading of fertilizer and sowing grass seed. The hopper, distributing and control mechanism are the same as that on the self-contained spreader of the hand-operated type, except that in use this unit is simply hung on the ground roller of the inverted mower. Disks on the ends of the distributor shaft contact the mower drive wheels and provide a positive friction drive that gives uniform distribution

8. PICKUP TWEEZER is especially designed to grasp small parts of almost any shape and hold them firmly for insertion or placement in intricate assemblies such as radio or TV chassis, instruments and models. Depressing a plunger at the top of the pencil-size body causes three hooked, spring-steel fingers to extend from the tip and flare outward. Releasing plunger retracts fingers on the part to be picked up and held, such as the screw in the photo. Made entirely of stainless steel. Can be sterilized without harm

9. HAND PORTABLE ARC WELDER is easily carried to the job. Operating on 110-220-volt current it has a heat range of 15 to 200 amp., a 50-percent duty cycle and handles electrodes from 3/64 to 5/32 in. Cabinet is 10½ in. long, 7 in. wide, 6¼ in. high. Unit weighs only 65 lb. Can be equipped for welding, brazing, soldering, cutting or preheating, using either the metallic-arc or carbon-arc process. Because of its light weight, it is especially suited to the needs of farmers, garages, metal-fabricating shops and also home workshops



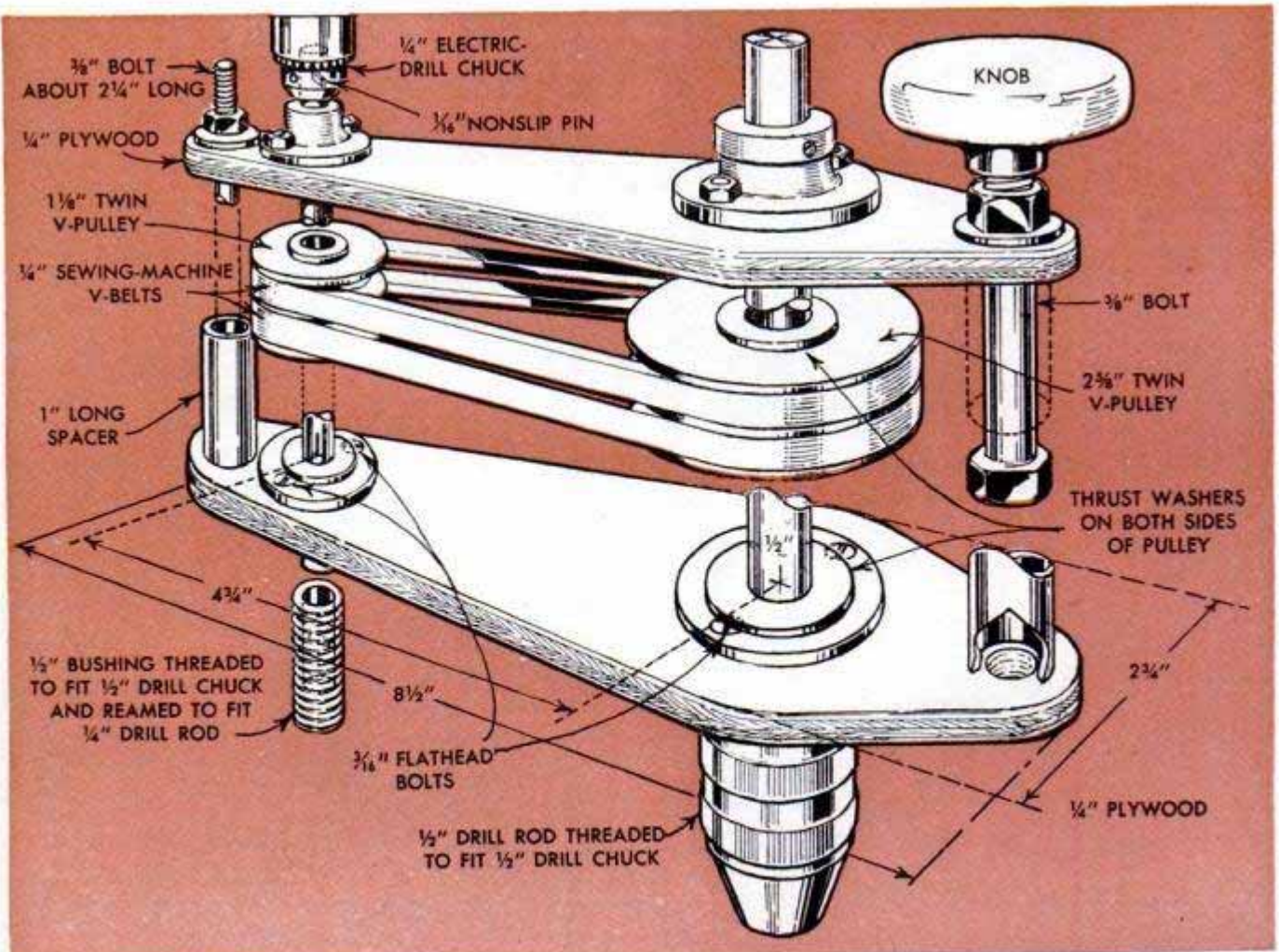
HANDY *Speed-Change* ADAPTER

By Carl S. Bates

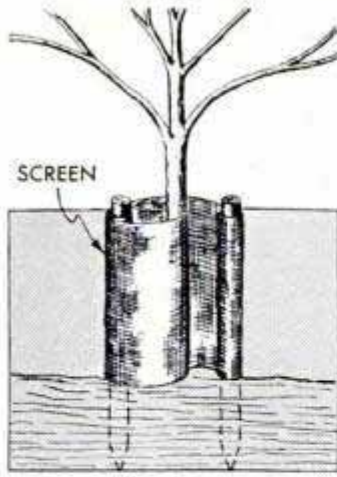


Speed-change adapter, shown above chucked in $\frac{1}{4}$ -in. electric drill, will reduce speed of large drill bit or auger bit $2\frac{1}{2}$ times when pulleys of sizes specified are used. Large pulley is made from hardwood

THIS HANDY speed-change adapter will enable the home craftsman to speed up a $\frac{1}{2}$ -in. electric drill for high-speed drilling and buffing, or slow down a $\frac{1}{4}$ -in. drill for driving large drills and auger bits. The unit consists of $\frac{1}{4}$ and $\frac{1}{2}$ -in. spindles mounted in a plywood frame assembled with spacers, bolts and nuts. The spindles turn in flanged bushings that are attached to frame members with flathead bolts or machine screws, while the dual pulleys are locked to the spindles with setscrews. To prevent end play, thrust washers are placed between the pulley hubs and the bushings. One end of the $\frac{1}{2}$ -in. spindles is threaded to take a $\frac{1}{2}$ -in. screw-type chuck. A threaded bushing, or sleeve, is pinned to the $\frac{1}{4}$ -in. spindle to permit use of the same chuck on both spindles. The 16-in. V-belts preferably should be purchased in matched sets. The knob, taken from a car-gearshift lever, screws onto either of the frame bolts.



Screening Protects Young Trees



You can save much of the time spent in wrapping and unwrapping paper or cloth used to protect young fruit trees from rabbits by using strips of screen wire tacked to wooden stakes. The wire is wrapped around the trees to form close-fitting cylinders, and the stakes forced into the ground to hold it in place. This method also is said to be better for the trees, as the screen does not hold the heat that may come from a mid-winter sun, causing the sap of the trees to rise and become frozen and thus damage the trees.

George Laycock, Batavia, Ohio.

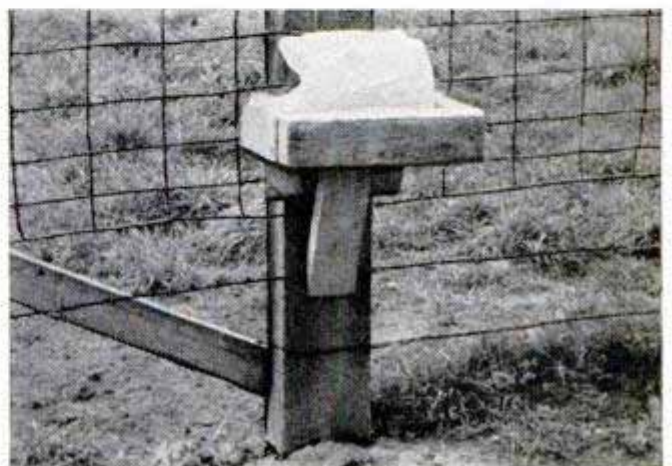


End Sections of Cattle Guard "Fold" Back to Pass Combine

To permit moving a combine or other wide implement through a cattle guard, one farmer built the end sections so they could be swung back to widen the opening. The sections were made into one-piece units which then were mounted to pivot on bolts in the upper ends of permanent gateposts. Another advantage of the arrangement is that cattle can be driven through the opening more quickly, due to ample clearance on both sides of the guard.

Salt Tray for Livestock

Rock salt, provided for cattle on pasture, can be kept clean and out of the mud if it is placed in a tray constructed of 2 x 4s and bolted to a fence post as shown. A brace spiked to the tray and to the post supports the weight and prevents damage to the tray should the cattle brush against it.—Charles L. Stratton, Hollis, N. H.



Metal Scriber From Drill Bit



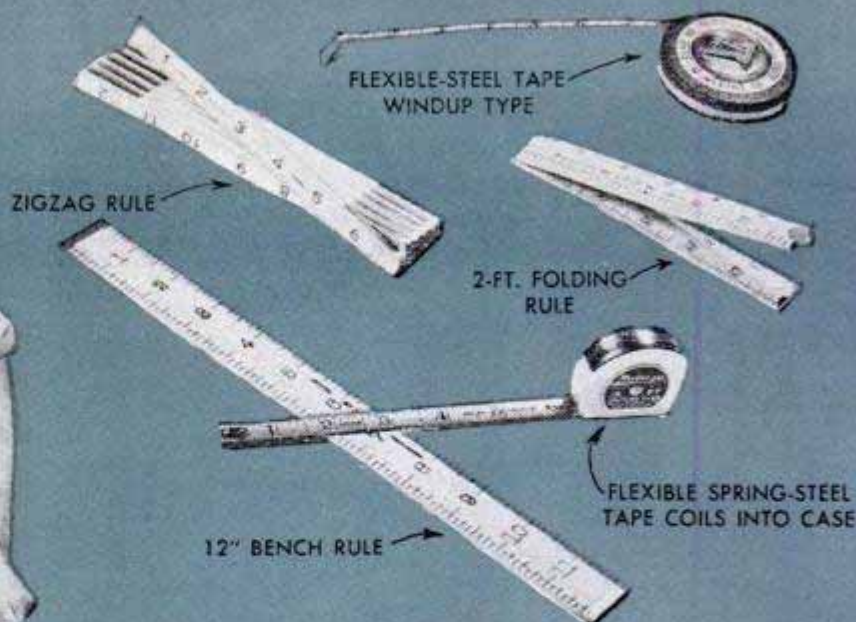
A scratch awl, or scriber, for layout work on sheet metal can be improvised from a discarded high-speed drill bit and a small block of wood suitable for a handle. The bit shank is press-fitted into a hole in the end of the block, after which the cutting end is ground to a sharp point.

Ray Jira, Cicero, Ill.

Taped Cutting Edges on Reamer Prevent Dulling When Stored



To protect cutting edges on reamers stored in a drawer or tool chest, simply wrap several turns of drafting tape around them as indicated. This not only prevents them from being damaged by contact with other tools but also prevents dirt from collecting in the flutes and dulling the edges. The tape can be removed easily and used again if desired.



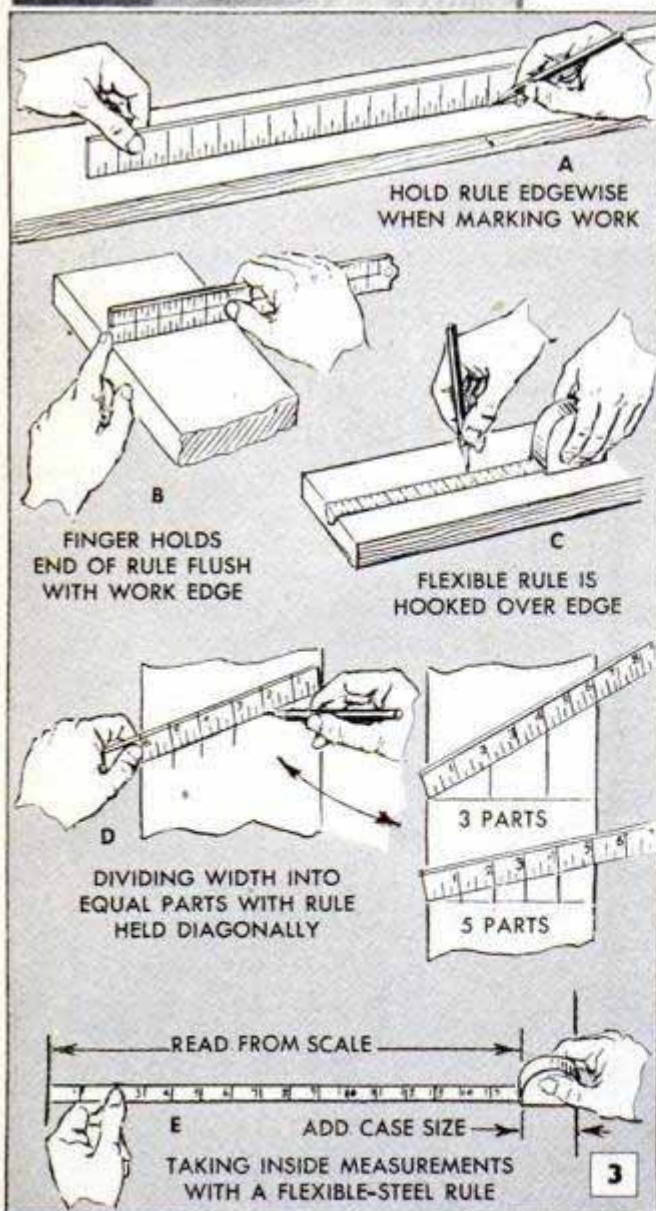
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MEASURING

GOOD CRAFTSMANSHIP begins with correct measurements. The process of measuring and marking wood for cutting to size, or locating holes to be drilled, is called layout work. The accuracy with which it is done determines the quality of the finished job.

Kinds of rules: Several types of common rules are shown in Fig. 1. Almost any kind of rigid wooden rule, such as a hardwood yardstick will be found convenient for rough work. Of course, any wooden rule soon becomes warped or nicked with use and cannot be used either as a straightedge or for marking dimensions. The worn ends result in inaccuracies and make it necessary to measure from the 1-in. mark. Because of these faults, brass-tipped rules, which retain the original accuracy at the ends, should always be used on work requiring accurate layout. Most rules are graduated in inches and fractions thereof, down to 16ths, sometimes to 32nds and even 64ths. Steel rules can be graduated more finely than wooden ones. You also can obtain rules having graduations in 10ths and 12ths of an inch, or having a metric scale. Engineer's rules have one side graduated in 10ths and 100ths of a foot.

Hinged folding rules are 1 to 3 ft. long and the hinges and tips are of brass. Zigzag rules are 6 to 8 ft. long and have spring-type locking joints. The one pictured in Fig. 1 has a sliding extension. Both types usually fold to 6-in. lengths so they can be carried in pockets conveniently. Hinged joints of folding rules should be lubricated with a light oil. Care also should be taken to keep the hinges clean, as an accumula-



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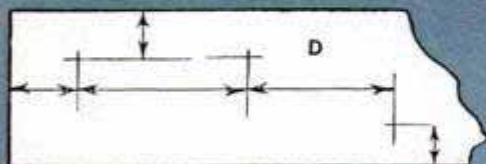
ACCURATE MARKING
AT LOWER EDGE
OF RULE

X-MARKS INDICATE
WASTE

B

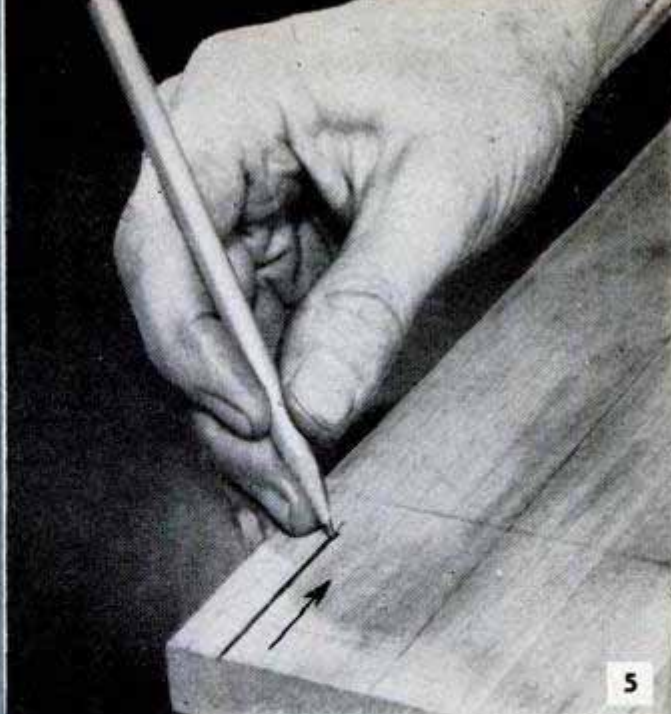
PARALLEL LINES ALLOW
FOR WIDTH OF SAW KERFS

C



4

LOCATING HOLE CENTERS ACCURATELY



5

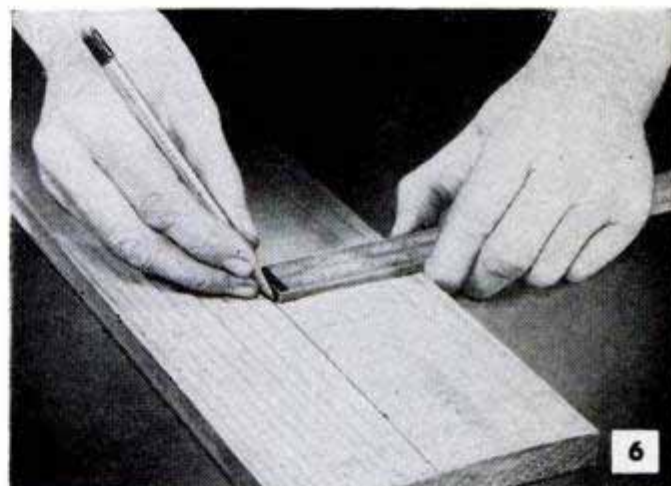
and MARKING WOOD By E. R. Haan

tion of dirt may cause binding and even breakage.

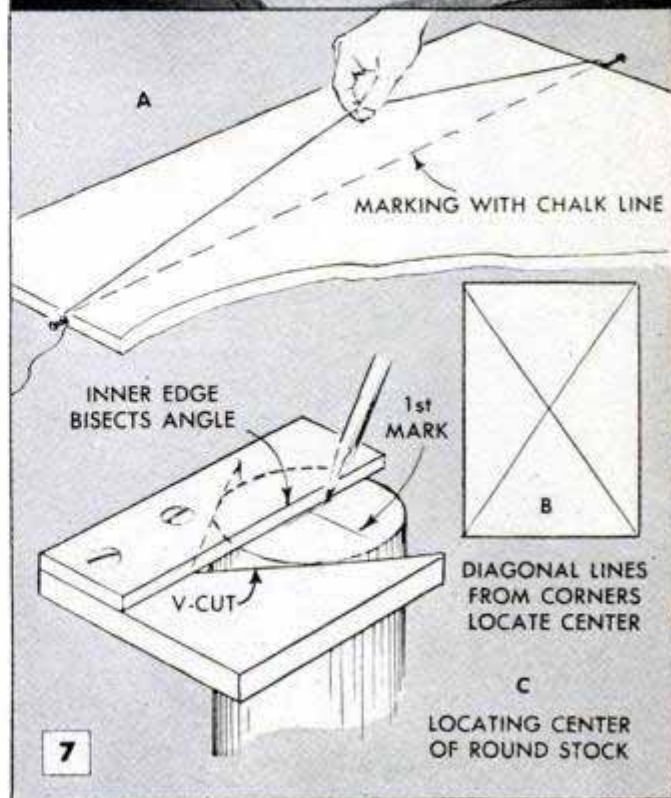
Flexible-steel rules of the "pull-push" type usually are $\frac{1}{2}$ or $\frac{5}{8}$ in. wide, and 6, 8 or 10 ft. long. They can be extended rigidly for some distance when supported at one end only, yet have flexibility so they can be used for measuring curved surfaces. Those having a case with one flat side are especially handy for inside measurements. Some have a sliding hook at the end which is self-adjusting when taking either inside or outside measurements. Cloth or steel tapes, wound in cases, are available in lengths of 50 and 100 ft.

Using rules: A rule can be held flat on the work as in Fig. 2, when marking is done at the end of the rule. In this case you use your thumbnail to keep the scale mark aligned with the edge. When marking off measurements from a wooden rule at various points, hold it edgewise on the work as in detail A, Fig. 3, so that the scale marks will come as close as possible to the work surface. This reduces the possibility of error. When measuring from an edge, set the end of the rule flush with the work edge, using your finger to keep both in line as in detail B—except in case of a flexible rule having a self-adjusting hook end, which is simply hooked over the edge as in detail C.

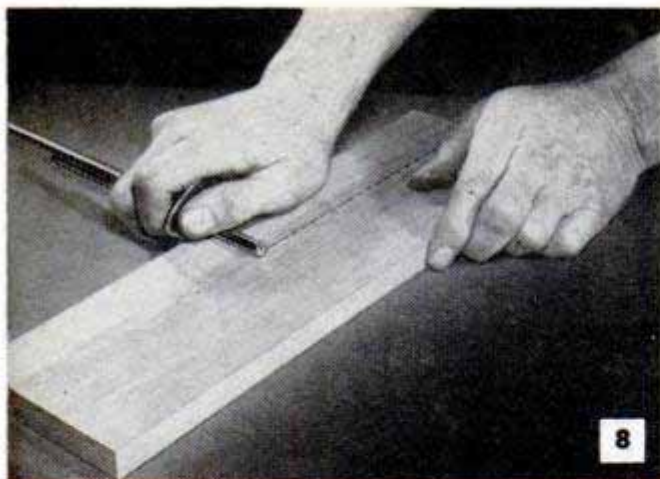
To divide the width of a board into any number of equal parts, hold a rule diagonally as shown in detail D. Then the width is divided by equal divisions of the rule, which is much simpler than dividing the actual width mathematically. For large inside dimensions, hold two rules together,



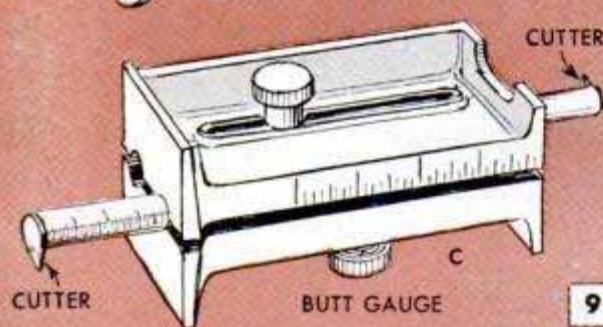
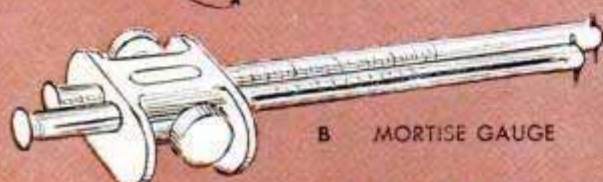
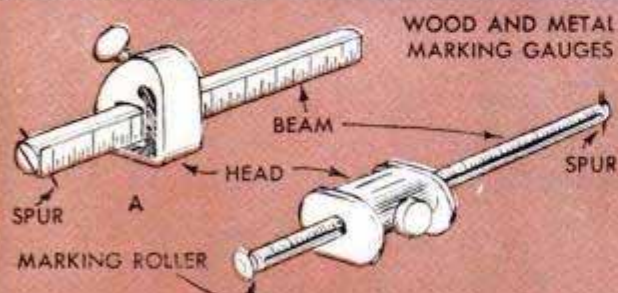
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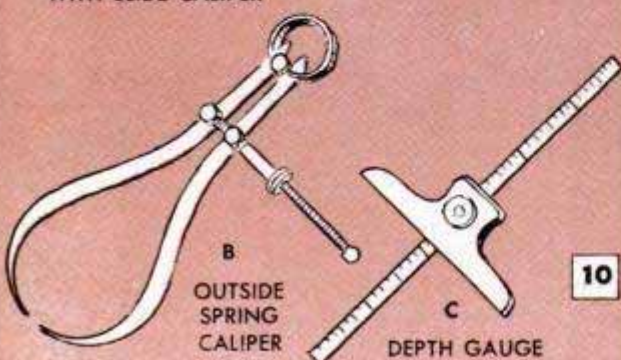
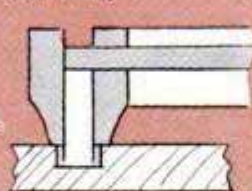
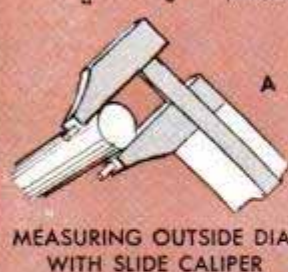
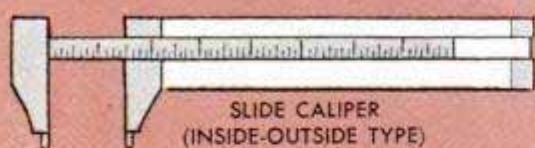
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8



9



10

and then add the distance that one extends beyond the other. You also can use a zigzag rule having a sliding extension, or a flexible, coiled rule as in detail E, the size of the rule case then being added to the actual rule measurement.

Marking the work: Pencil marks usually are too wide for accuracy, although a hard-lead pencil, kept very sharp, generally is satisfactory. Where greater accuracy is required, use a scratch awl or the point of a knife blade. Always be sure that the point of the marking instrument is next to the rule where it contacts the work as in detail A, Fig. 4. Mark Xs on the waste side of a line, detail B. Remember that sawing should always be done on the waste side, never on the work side. When marking a number of adjoining pieces to be cut from one board, mark double lines to allow for the saw kerfs, detail C. To indicate locations for holes, the dimension or layout lines should intersect, detail D.

When marking parallel to an edge, and extreme accuracy is not essential, follow either of the methods shown in Figs. 5 and 6. Where an edge is irregular so that it cannot be used as a guide from which to mark, use a chalk line, detail A, Fig. 7. To quickly locate the center of square or rectangular ends of stock, mark diagonal lines from opposite corners, detail B. Centering the end of round stock is simple with the homemade tool shown in detail C.

Marking, mortising and butt gauges: Figs. 8 and 9 show marking gauges, which are used to scribe lines parallel to edges. They may be either wood or steel. The pointed pin or roller cutter that makes the mark is fixed at the end of the beam and is adjusted to the required distance from the head. In use, hold the head of the gauge in the palm and push it forward, keeping the head firmly against the edge of the work, Fig. 8.

A mortising gauge, detail B, Fig. 9, is quite similar, but has a double beam. The scribing points are spaced the required distance to scribe two parallel sides of a mortise at the same time.

A butt gauge, detail C, Fig. 9, is used for marking hinge recesses, or "gains." It has two bars fitted with cutters to mark the width and depth of the gain. The cross-lines are made with a knife edge drawn along the body of the gauge while it is held against the work like a try square.

Calipers and depth gauge: You can measure the diameter of dowels and other small round stock easily and accurately with a slide caliper, detail A, Fig. 10. The one shown takes both inside and outside measurements. Outside measurements can be taken also with a spring caliper, detail B. To measure the depth of holes that are too

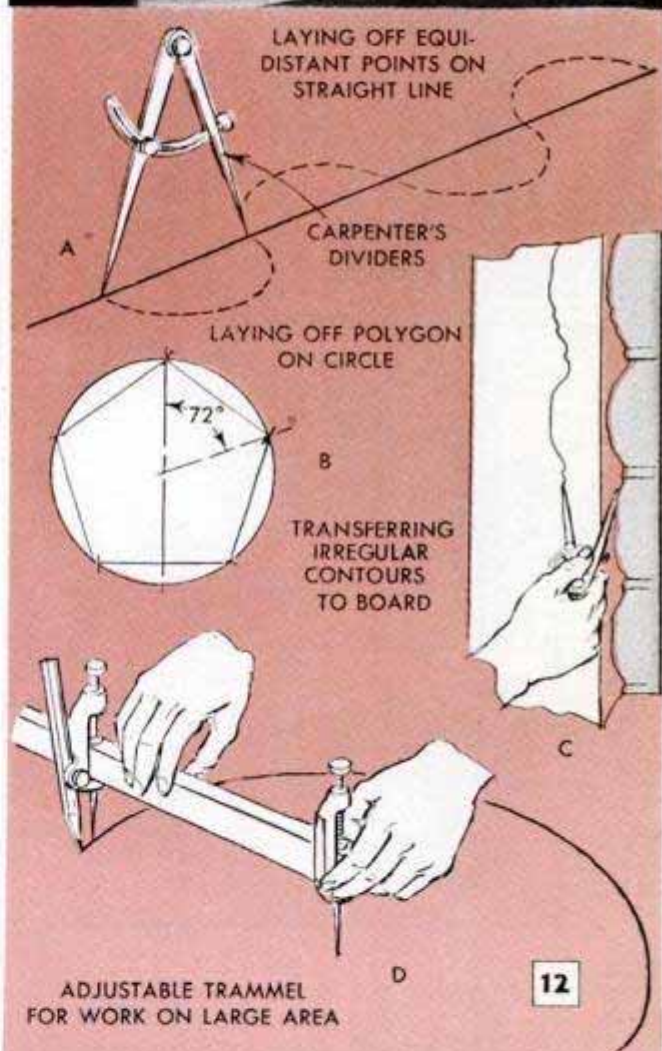
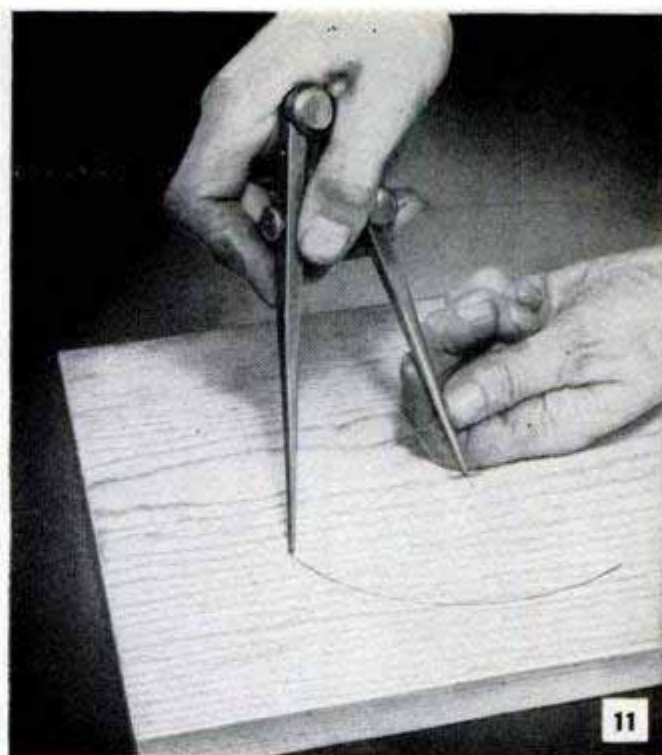
small for the insertion of a rule, the simplest way is to use a dowel, marking it at the top of the hole and then measuring the marked-off portion. The extension of a zig-zag rule can also be used. A separate depth gauge consists of a narrow rule fitted with a sliding head as in detail C, Fig. 10.

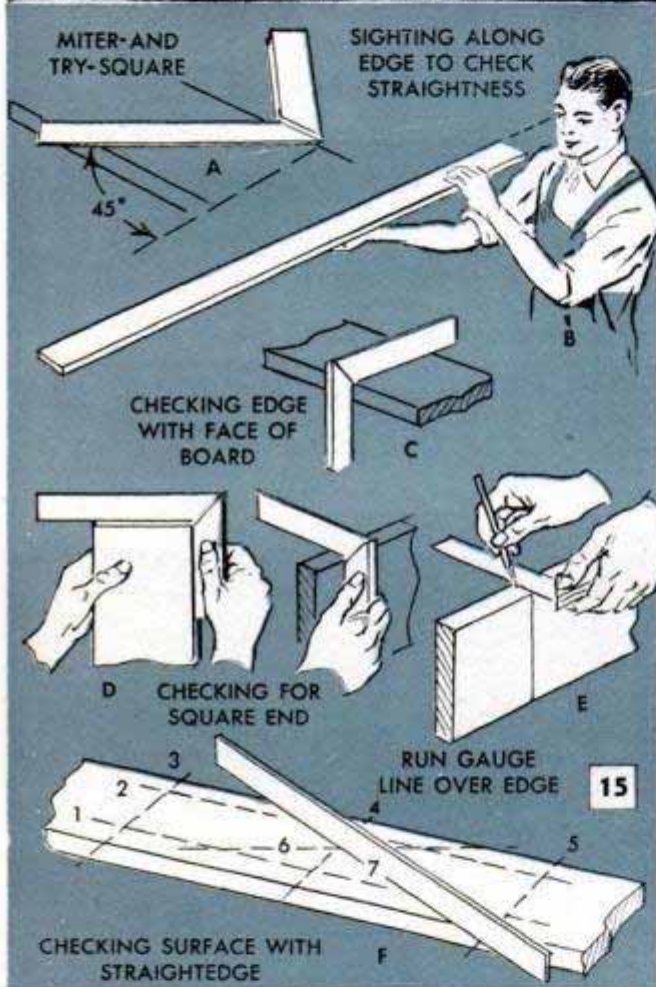
Dividers or compass: Besides being used for scribing circles and arcs, Fig. 11, a carpenter's dividers or compass enables you to lay off a series of equidistant points as in detail A, Fig. 12. It also is used to divide a circle into equal divisions as in detail B, and to mark the contour of an irregular surface on a piece of wood held next to it, detail C. The tool has two pointed legs, one of which slides along a quadrant to which it is locked with a thumbscrew. A fine adjustment is made with a knurled nut on the threaded end of the quadrant while the points are being properly spaced on a scale as shown in Fig. 13. A pencil-holding compass can be used where marks must be more visible. To scribe arcs and circles beyond the capacity of the usual compass, trammel points mounted on a hardwood beam, detail D, Fig. 12, are used. One point may have a clamp to hold a pencil.

Try squares: Use a try square for marking across boards at right angles to the edges, also for checking the squareness of ends and edges in relation to the surface of a board and for checking the flatness of surfaces, Fig. 14. A try square is L-shaped and consists of a wooden or cast-iron handle fixed at right angles to a steel blade which is graduated for measuring. Those having a 45-deg. bevel on the handle next to the blade are called miter-and-try squares, detail A, Fig. 15. Blade lengths vary from 4 to 12 in., the 8-in. blade being the most common for homeowners.

Before using a try square, always check the straightness and uniformity of one edge of the stock by sighting along it as in detail B, Fig. 15. A rough, irregular edge may cause inaccuracies in squaring and may require planing or sawing to obtain a true edge. Also check the edge for squareness with the surface, detail C. Next check the end two ways for squareness, detail D, before measuring from it for marking. When cross-marking the surface of a board, continue the mark over the edge, especially on thick stock, detail E. This makes it easier to make a true right-angle cut with a handsaw. To check flatness of a surface, hold the blade of a square or straightedge in the seven positions shown in detail F. Holding the work toward the light will show up small surface irregularities plainly.

A combination square, Fig. 16, has a sliding head, or handle, which can be locked at any point along the length of the blade. One edge of the head is at right angles to

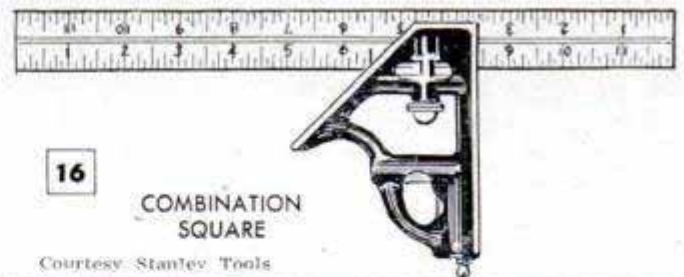




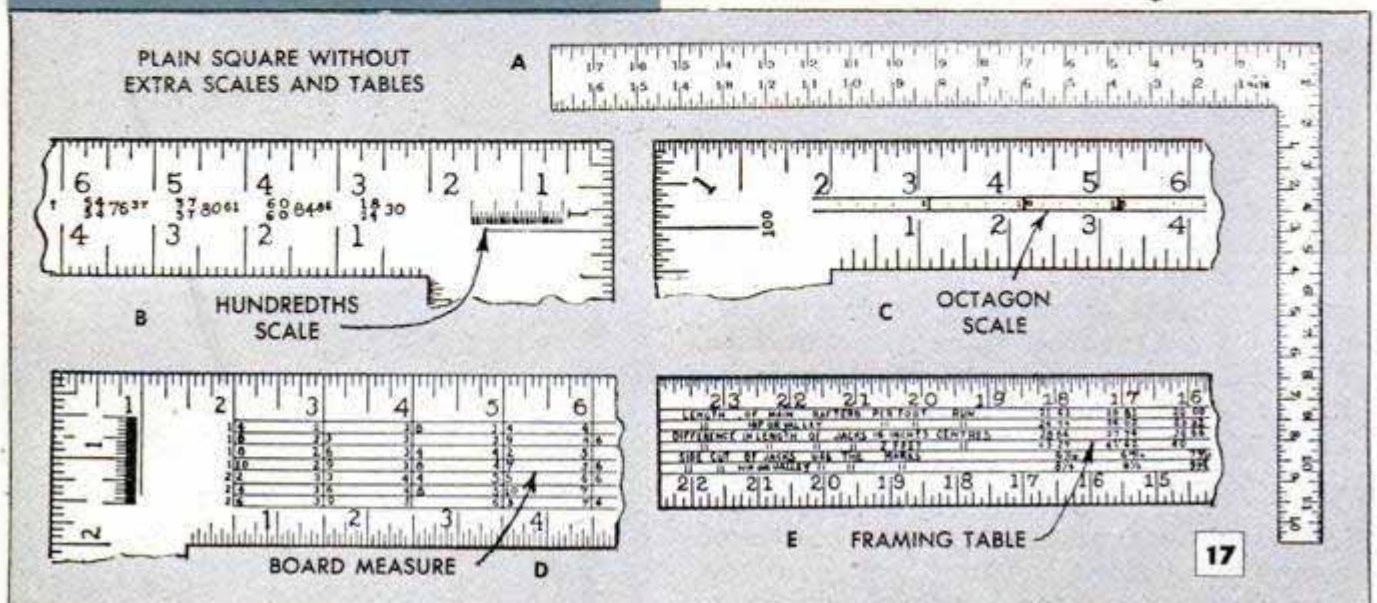
the blade and the other at 45 deg. The head usually is fitted with a spirit level.

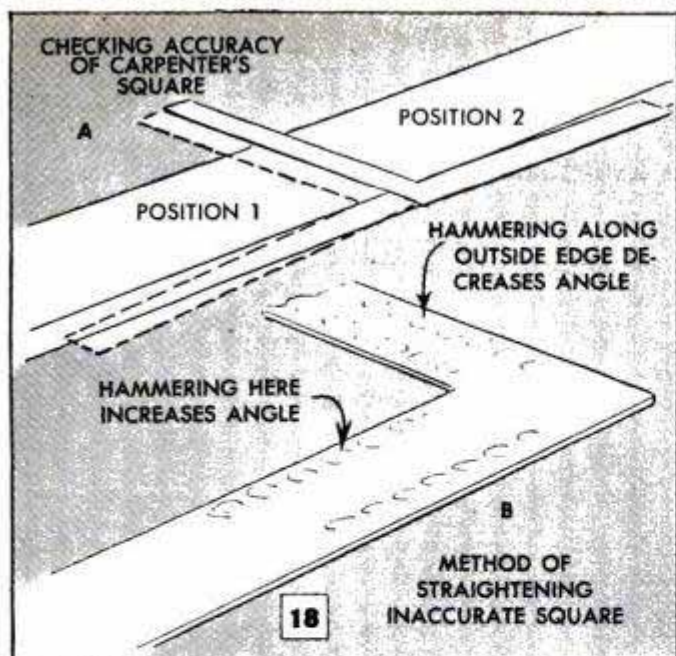
Carpenter's square: For work beyond the capacity of a try square, or where a straightedge up to 24 in. long is needed, use a carpenter's square, detail A, Fig. 17. This is an L-shaped piece of steel or lighter metal about $\frac{1}{8}$ in. thick and 2 in. wide. The body is 24 in. long and the tongue is 14 to 18 in. long. Both are graduated. Many squares also carry additional scales, for example, a $\frac{1}{100}$ -in. scale is located on the back of the tongue in the corner or "heel" of the square, detail B. By using a pair of dividers on this scale, decimal values of an inch are quickly obtained. A brace-measure table appears on the same side, also shown in detail B. This gives the length of common braces. An octagon scale is located on the face of the tongue, detail C. This enables you to lay out an octagon on a square. A board-measure table appears on the back of the body, detail D. It is used to find the number of board feet in a piece of lumber. A rafter, or framing table appears on the face of the body, detail E. This is used to determine the length of rafters and the angles to cut them to fit properly at the plate and ridge. A booklet giving detailed instructions on using these scales and tables usually is furnished with squares by manufacturers.

Checking accuracy of squares: To check the accuracy of a square that may have been dropped or otherwise damaged, hold it in the two positions shown in detail A, Fig. 18, with the body against an edge



Courtesy: Stanley Tools





which is perfectly straight. If the tongue in position 2 does not line up perfectly with a knife cut made along its edge in position 1, the square is not true. To correct this condition, lay the heel of the square on an anvil and carefully hammer it—near the inner edges if the square is less than 90 deg., and near the outer edges if the angle exceeds 90 deg., detail B. Hammering expands the metal and straightens the blade.

Bevel square and angle dividers: For marking or testing bevels and angles, use a bevel square (also called a sliding T-bevel), Figs. 19 and 20. The blade can be locked at any angle within 180 deg. from the handle. The simplest way to set this tool to the proper angle is to use a protractor. However, you can set it without a protractor for 45, 30 or 60-deg. angles by simple measurements as shown in the lower details, Fig. 20. An angle divider, detail A, Fig. 21, is used to measure and divide angles for a miter cut in one operation. Two blades, pivoted at the end of the body, are moved toward, or away from it simultaneously. The handle has graduations for laying off 4, 5, 6 or 10-sided polygons.

Irregular designs: Rather than attempt to lay out irregular curves and shapes on wood, it's best to transfer the designs from patterns easily cut from heavy paper. Where a design has symmetrical halves, only a half pattern is needed. First mark a light center line on the work with a soft pencil for easy erasure. Then trace the pattern on one side of the line, reverse it and trace it on the other side, detail B, Fig. 21. To enlarge or reduce a design use a pantograph. Or, do it freehand, using squares as a guide. Squares are first ruled on the design, then larger or smaller ones on pattern paper according to the size of the reproduction desired. When curves are involved use care in ruling the lines. ★ ★ ★

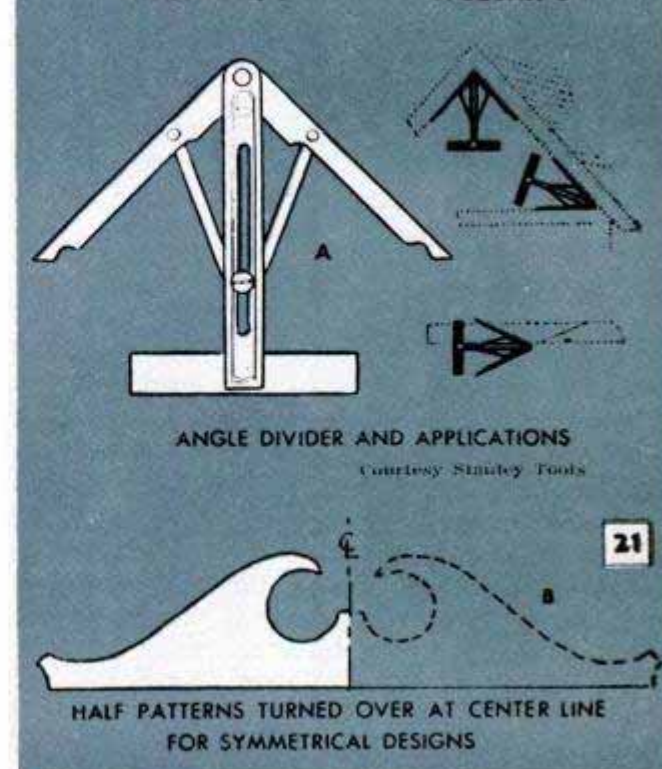
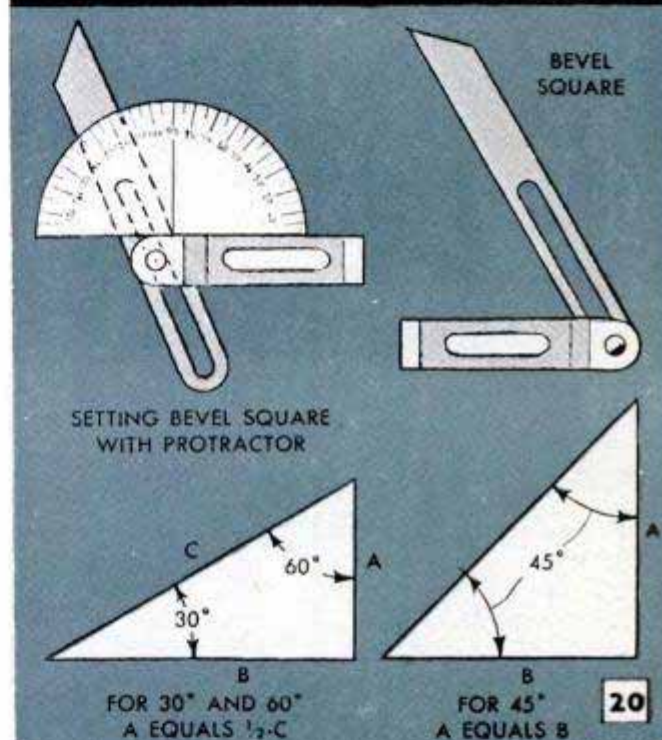
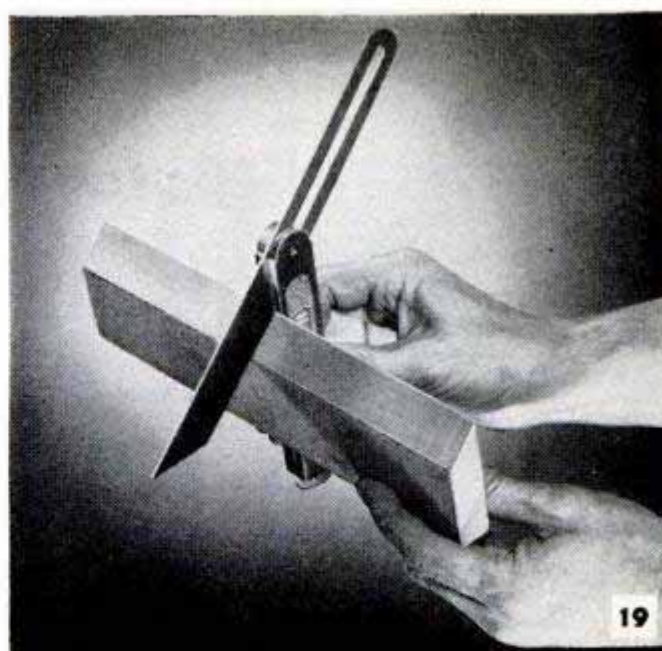
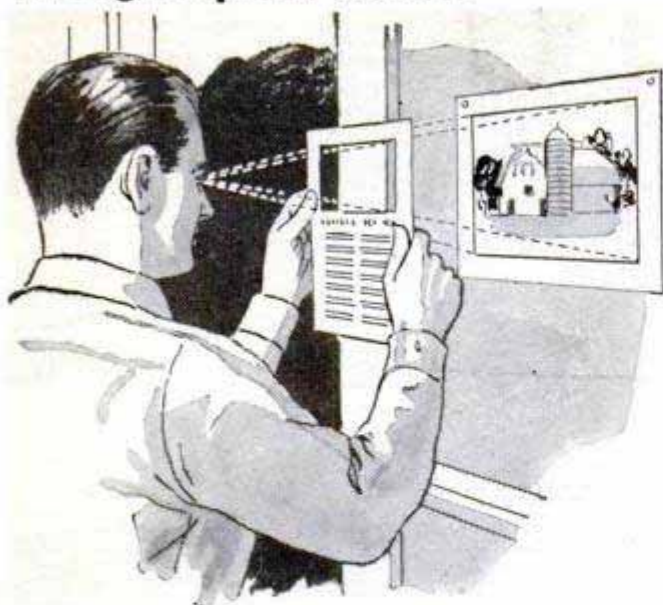
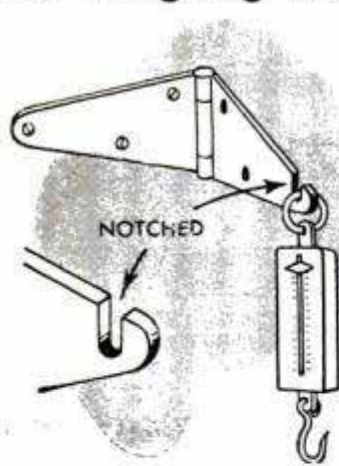


Photo Visualized on Page Through Optical Illusion



To approximate the appearance and size of a picture on a page, one artist cut out the portion of the page the picture was to occupy, tacked the latter to the wall and held the page in the manner shown. By moving the page back and forth, the size of the image as it appears through the cut-out portion can be varied and the necessary reduction or enlargement in the size of the photograph easily determined.

Notched Hinge Supports Scale For Weighing Poultry Feed



Attached to the wall of a feed room, a strap hinge notched at one end is used by a poultryman to support a spring scale when weighing feed. When not in use, it is swung out of the way against the wall. — G. E. Hendrickson, Argyle, Wis.

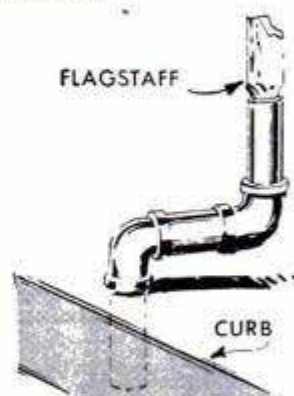
Emergency Distributor Repair

If the breaker-point spring in a car distributor should break while on the open road, a simple repair can be made with a hairpin or piece of stiff wire that will serve to operate the points until a garage is reached. First, bend one end of the wire around the rotor-pivot post where the broken spring is fastened. Then place a piece of heavy paper between the wire and the distributor housing for insulation. If the breaker points become badly burned and pitted so they do not produce a good

spark—and no file is available for smoothing them down—they may be cleaned sufficiently for the drive home by rubbing them against a rock or other abrasive surface such as the exhaust manifold.

Flagstaff at Curb Protected By Offset Pipe Holder

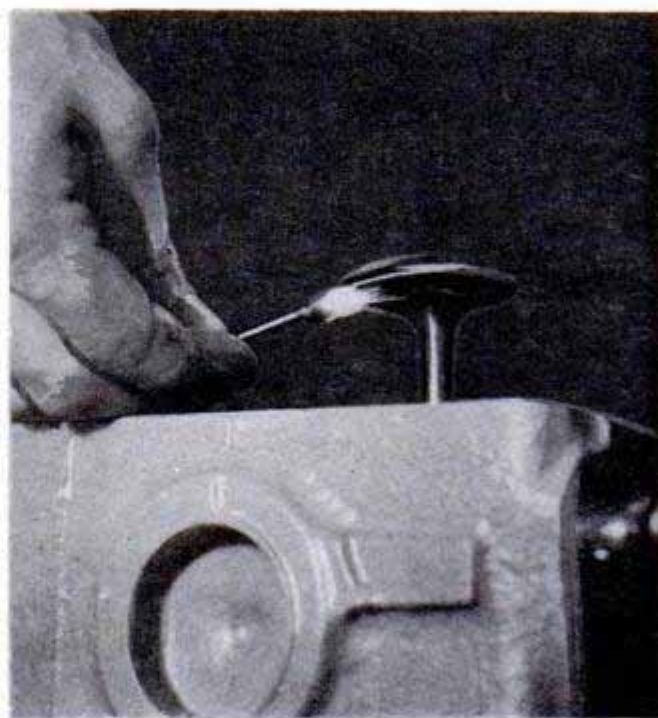
When the sockets for flagstaffs are located near the edge of a low curb, the staffs can be protected from damage by bumpers of parked cars if mounted in offset sockets in the manner shown. Assembled from pipe nipples and elbows, the sockets will support the staffs



a sufficient distance from the curb to keep them clear of the overhanging bumpers.

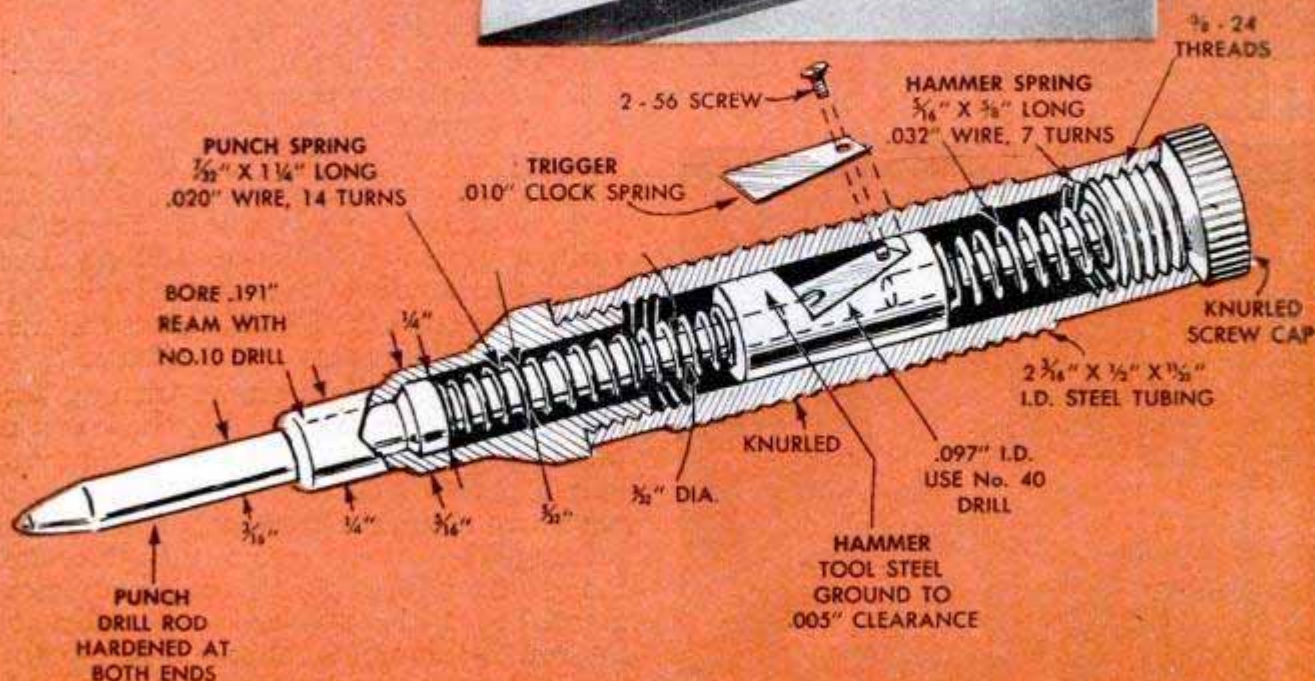
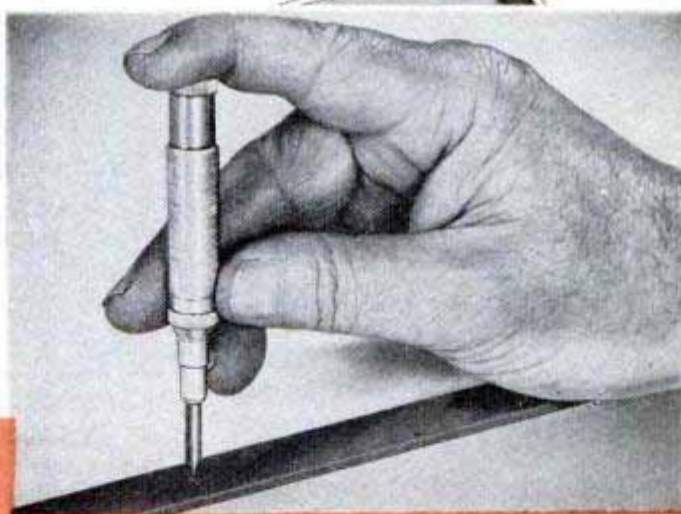
Quick Method of Testing Engine-Valve Seating

After a valve in an automobile engine has been machined or hand-lapped, it can be tested easily for proper seating by applying the flame of a match or candle to its face as shown. This will leave a deposit of soot on the face of the valve, which then is forced down into contact with the valve seat. The valve is turned in the seat slightly and then lifted and inspected. If the film of soot is unbroken all the way around, the valve is seating properly. If there is a spot where the soot is broken, improper seating of the valve at this point will be indicated.



MAKE YOUR OWN AUTOMATIC PUNCH

REPETITIOUS SPOTTING of holes in light sheet metal is made much more convenient when the work is done with an automatic center punch, since a hammer is not required as with a regular center punch. The cutaway drawing below shows how it works. After placing the punch on the work, it is operated by simply pressing down on the handle. This causes a short, spring-loaded rod to enter a built-in hammer and, in turn, release a clock-spring trigger bearing against the end of the hardened punch stem. This action releases the hammer which is propelled downward against a shoulder on the punch stem and thus exerts a sudden, sharp blow sufficient to dent the work. Obviously, the hammer spring is stronger than the punch spring and provides the driving force. The punch spring serves to return the hammer and reset the trigger. It is important, of course, to wind the springs of the size wire specified. In assembling the parts, you'll note that the hammer spring is held under tension by the knurled screw cap which threads into the end of the punch. The body of the punch is machined from a length of $\frac{1}{2}$ -in.-o.d. steel or brass tube. The hammer should have a .005 clearance inside the tube.



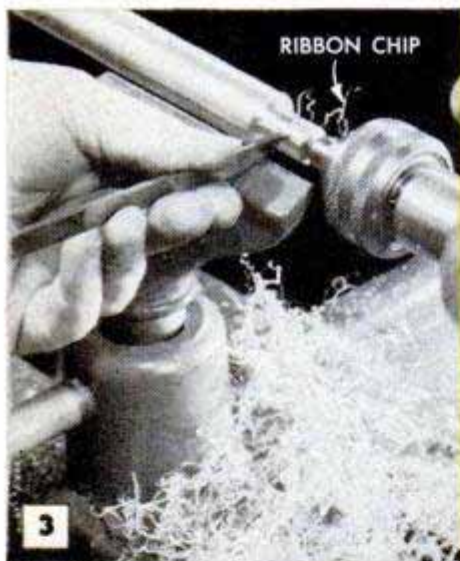
METAL TURNING

Freehand

By Sam Brown



Above, chest position is useful for rough-turning metals. Glove on left hand protects against chip burns. Below, aluminum turned with positive rake cuts smoothly with a continuous ribbon chip



RIBBON CHIP



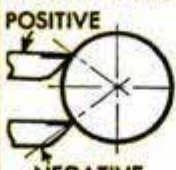
ZERO RAKE



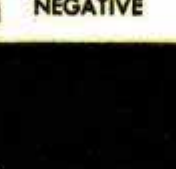
POSITIVE RAKE



NEGATIVE RAKE



POSITIVE



NEGATIVE



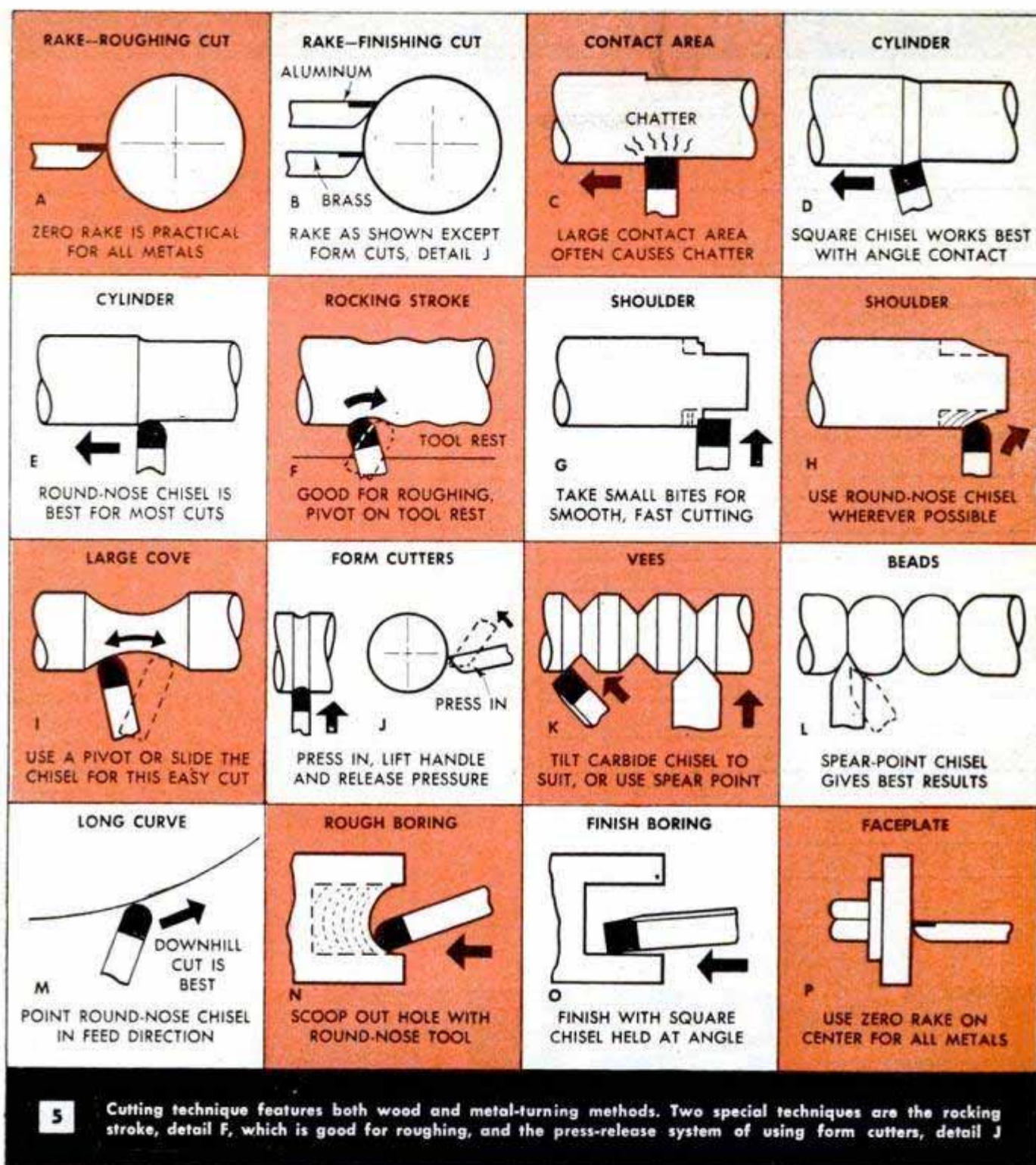
LEATHER

LEATHER SLIDE AIDS IN MAKING SMOOTH CUT

SOFTER METALS, such as brass and aluminum alloys, can be turned on a wood lathe, using ordinary wood-turning chisels. The secret is in driving the work at high speeds, 3000 to 3500 r.p.m. Rough-turning metal takes more time than rough-turning wood, and extreme care must be used not to overheat the chisel blades and draw the temper. After roughing, soft metals such as aluminum, can be turned to pattern with nearly the ease and speed of ordinary hardwood. Even mild steel can be roughed and turned, but more difficulty will be encountered in making certain deep cuts. For this reason carbide-tipped chisels are recommended for freehand turning of the harder metals. Carbide-tipped tools also can be substituted for wood-turning chisels in any of the metal-turning operations pictured.

Cutting technique: The various cuts, with chisel positions, are shown in Fig. 5, details A to P inclusive. Generally, roughing cuts in all metals should be done with negative rake, that is, lift the chisel handle, as shown in Figs. 1 and 2. Finishing cuts in brass also are negative rake, but finishing cuts on aluminum can be made with a heavy positive rake, up to 45 deg. This gives a true shearing action; the work is smooth and the chip comes off in a long ribbon, Fig. 3. One exception to positive rake in turning aluminum occurs when a chisel is used to cut its own form. Positive rake on this cut will cause chatter. If you turn with negative rake, detail J, Fig. 5, and with a press-and-release action during which the handle of the chisel is raised, the cut will be smooth. Fig. 20 shows this same operation. Refer also to Figs. 6 and 7.

Another special freehand-turning technique is the rocking stroke, shown in detail F, Fig. 5. The chisel takes short bites with a pivoting or rocking action and does not move along the tool rest as in ordinary turning. The rake is zero or negative. Combined with a chest position and body movement, Fig. 1, this stroke is especially good for rough-turning steel and brass, both of which tend to resist penetration. In the ordinary method of cutting, the chisel is



held somewhat more level and is moved along the tool rest as in wood turning. Movement is aided by polishing the tool rest or by using a waxed piece of leather under the tool, as shown in Fig. 4. Spring action of the leather also will help to prevent chatter in deep cuts.

Work speed: Generally, the top speed of the lathe — usually 3400-3600 r.p.m. — can be used for aluminum up to 1½-in. diameter. Larger work and harder metals may require lower speeds. As shown in Fig. 6, a speed of about 500 f.p.m. is best for average work in any metal. To support the tailstock end of the work at high speed, it is best to use a ball-bearing center as in Figs. 1 and 8. A dead center also can be

used but must be continuously lubricated.

Turning procedure: Simply follow approved methods for wood turning, but watch the rake angle of the turning tool. For clean, fast work, a half pattern tacked to ¼-in. plywood saves time. Work the chisel right over the pattern, Fig. 8, to set off lengths, using negative rake to avoid nicking the work. Then proceed in the usual manner, as shown in Figs. 9, 10 and 11.

The graver: The graver, or diamond-point tool, is an old-time favorite for free-hand metal turning. It usually is made from carbon steel. You can make your own from a square file, ⅜ in., or larger, grinding the bevel as shown in the inset, Fig. 13. For small V-cuts, the tool is used with the

METAL	EASE OF CUTTING*	**SPEED (Feet per minute)			REMARKS
		CARBON	HI-SPEED	CARBIDE	
Aluminum	50%	300	300	300	The ideal turning metal. Works well at any speed. Use positive rake for most cuts. Alloy 11S (Alcoa) is best for turning.
		400	600	600	
		800	2000	Up to 8000	
Brass	25%	150	300	300	Harder to turn than aluminum. Use negative rake. Free-cutting yellow brass and other leaded brasses turn the best.
		300	400	500	
		350	700	1000	
Magnesium	50%	150	300	300	Similar to aluminum. Speed should be kept under 1000 f.p.m. when cutting dry to avoid fine, hot chips which may ignite.
		300	500	500	
		400	700	700	
Soft Steel	8%	60 to 140 f.p.m. Too slow for hand turning		300	Requires firm pressure. Use only carbide chisels for freehand turning at high speed. Screw stock is best for turning.
				400	
				1500	

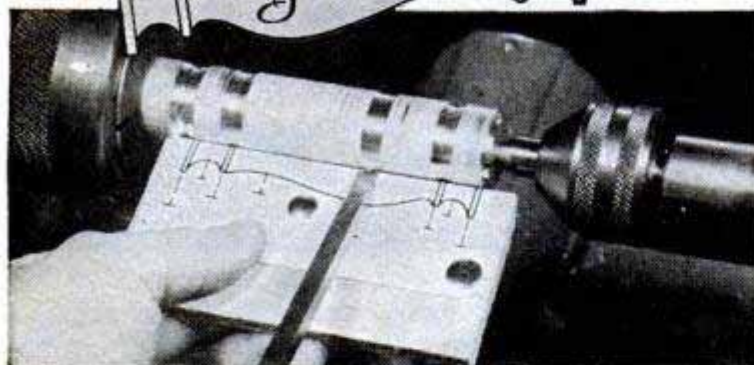
* Approximate machinability based on hardwood at 100%

** High and low limits are given with recommended speed in heavy type. Use table below to convert to revolutions per minute

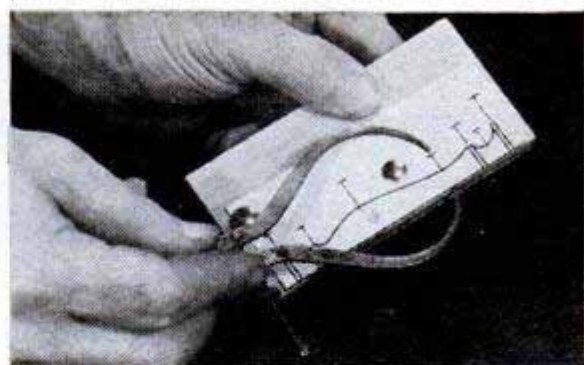
DIA. OF WORK	FEET PER MINUTE					
	300	400	500	600	800	1000
1/2"	2290	3056	3820	4580	6112	7640
3/4"	1530	2032	2540	3060	4064	5080
1"	1150	1528	1910	2300	3056	3820
1 1/2"	754	1016	1272	1508	2032	2544
2"	574	768	956	1148	1536	1912
3"	382	502	636	764	1004	1272
4"	286	384	476	572	768	952
6"	192	256	320	384	512	640

bevel up, Fig. 13. For other cuts, the tool is worked with the bevel down, Fig. 12. Note in Fig. 14 that the chisel contacts high on the work. It is common practice to rock the stroke, covering a small area and then moving to a new position.

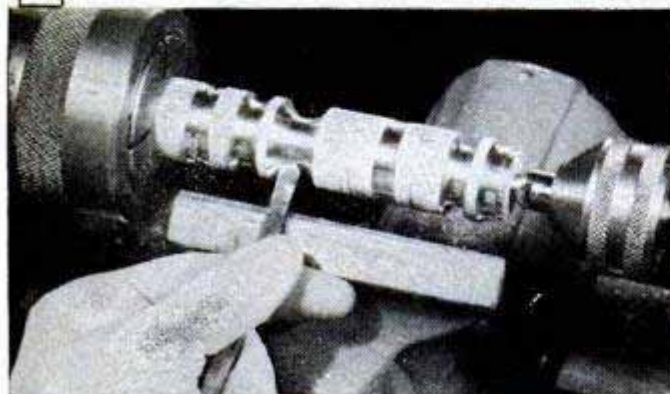
Assemblies: When the work varies widely in diameter, such as the candlestick in Fig. 15, you can save time and material by making separate parts and then press-fitting together, Fig. 16. Be sure the work is cool before making the final cut on a tenon, as hot metal shrinks and you may end up with undersize work. A threaded assembly is generally best since it gives a positive fit and also permits easy disassembly when necessary. On the aluminum hammer, Figs. 17 to 20 inclusive, the thread is cut with a



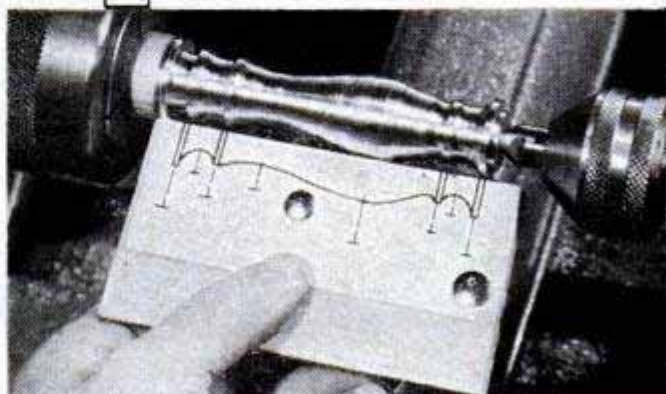
8 LAY OFF LENGTHS FROM PATTERN TACKED TO PLYWOOD



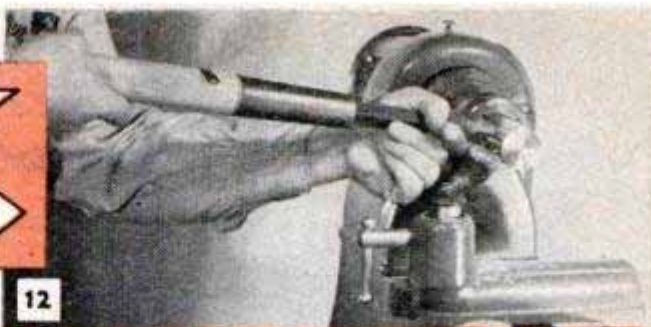
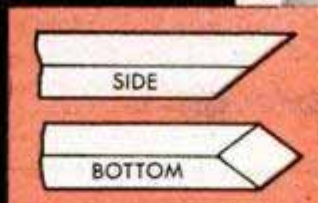
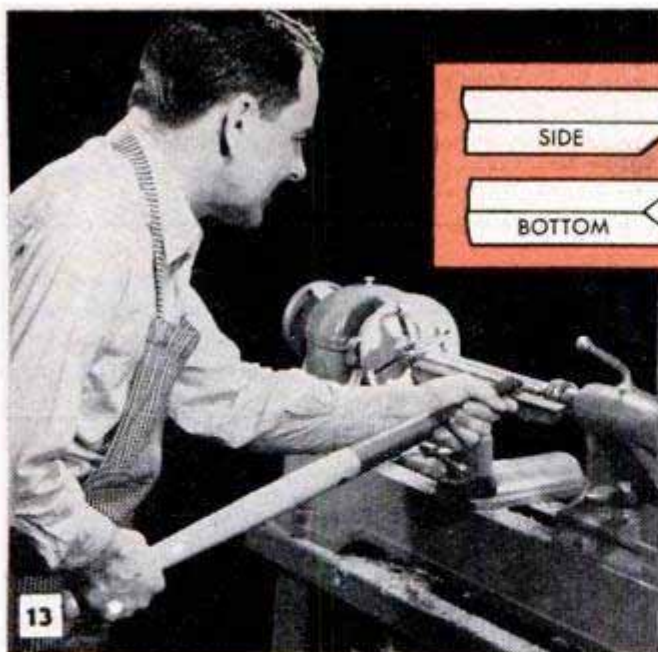
9 SET CALIPERS TO DIAMETERS



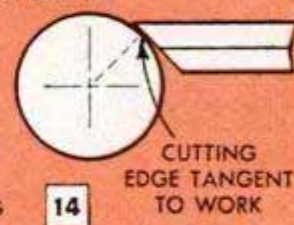
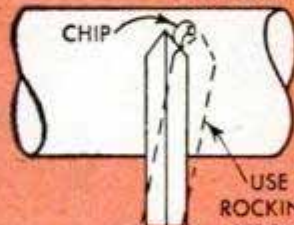
10 ROUGH-TURN THE VARIOUS DIAMETERS



11 CHECK CONSTANTLY WHILE TURNING

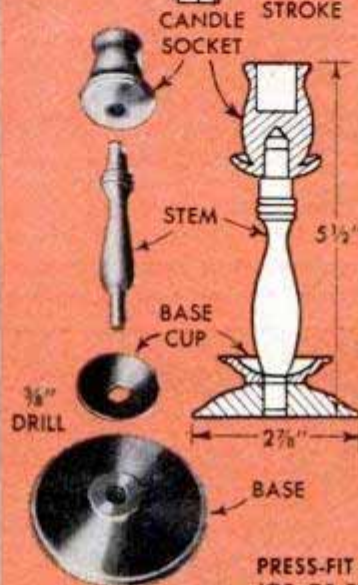


GRAVER CAN BE USED WITH BEVEL UP FOR V-GROOVES OR WITH BEVEL DOWN FOR TURNING. NOTE CUTTING ACTION

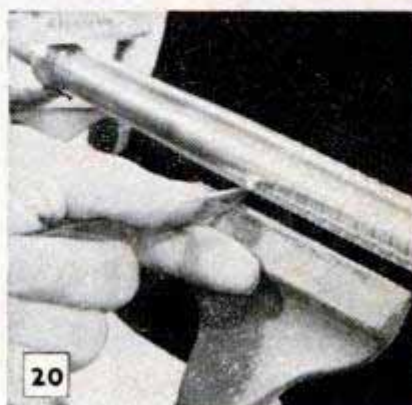
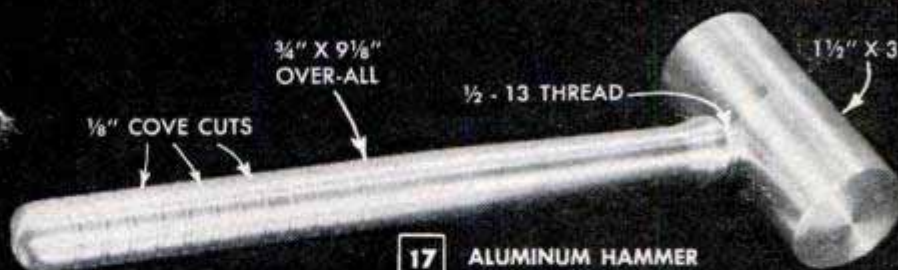


$\frac{1}{2}$ -13 die, as shown in Fig. 18. The hole in the head, Fig. 19, is tapped on the drill press to assure a straight thread.

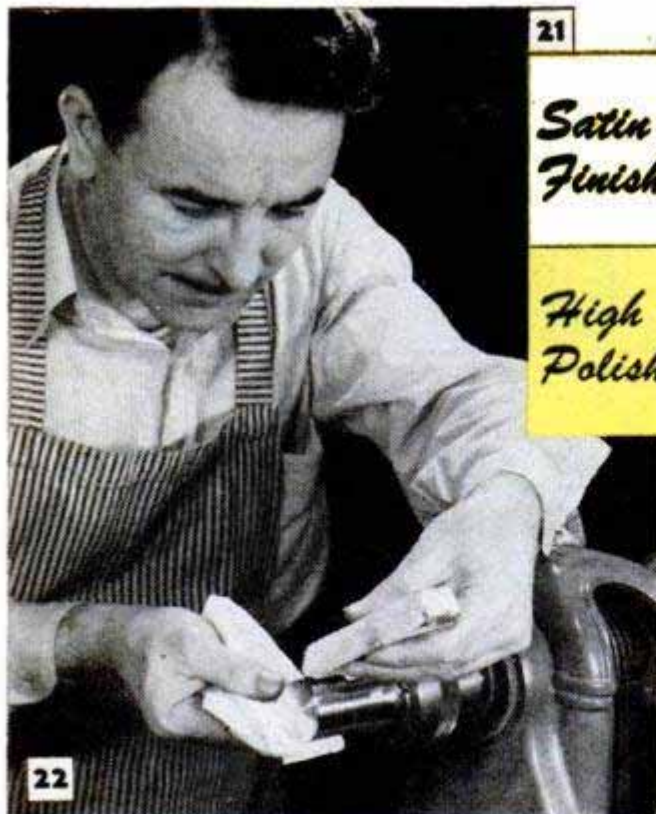
Polishing: At high speed, the turning tool leaves the metal quite smooth. Abrasive as fine as 2/0 grade will rough up a good turned finish. The abrasive paper or cloth is useful, however, in smoothing contours. Steel-wooling after turning gives an attractive satin finish. A high polish, Fig. 21, usually is obtained with buffing compound, holding the abrasive stick against the rotating work to transfer compound to a cloth pad, as shown in Fig. 22. Of the various compounds, emery is coarse enough to remove the fine tool marks. Tripoli also will cut, but much finer. Red or white rouge burnishes the surface to a high luster.



PRESS-FIT ASSEMBLY SIMPLIFIES JOB OF TURNING PIECES WHEN DIAMETERS VARY CONSIDERABLY



THREADED ASSEMBLY IS WORKED WITH TAPS AND DIES—HAS ADVANTAGE OF PERMITTING DISASSEMBLY OF PARTS



Satin Finish

Use a 6/0 aluminum-oxide abrasive or 3/0 steel wool, dry. Softer luster is produced with soapy-water lubricant. Dry pumice on wet cloth gives similar results. Rottenstone applied in same way is suitable.

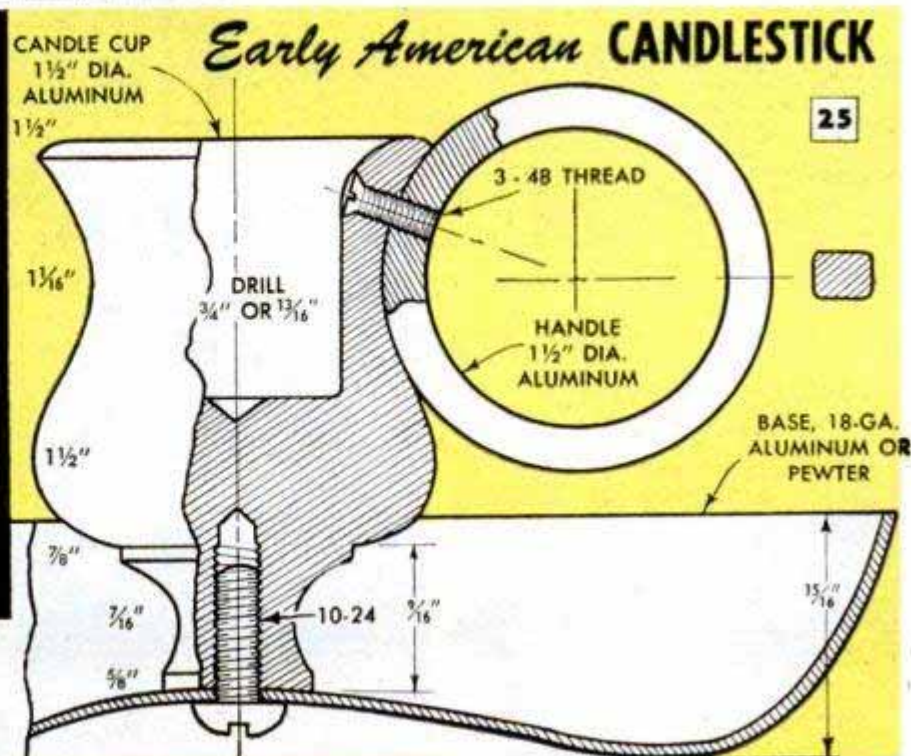
High Polish

Work up a satin finish first and follow with tripoli buffing compound. Finish with a stainless-steel compound to remove all scratches. A mirror polish is easily obtained with a red or white rouge.

Above, when polishing apply stick to metal. Abrasive will be picked up by cloth without loss. Below, several examples of freehand turnings in various metals include cigarette holder, pipe and miniatures.



What to make: Turned projects in metal include candlesticks, Figs. 24 to 37 inclusive, ship's wheels, lamps, cigarette holders, salt shakers, jewelry, stamp dispensers, paperweights, goblets and a variety of other items. Miniatures, such as shown in Fig. 23, are fun to work in either aluminum or brass. The Early American candlestick, Fig. 24, is fully detailed and makes an interesting project. The base or tray is a simple spinning project and can be worked by either spinning the metal disk into a hollow chuck or over an external chuck. The ring handle can be soldered instead of using the screw fastening shown. All of the turning on this job can be done at 3400 r.p.m. although a somewhat lower speed is quite satisfactory. At 3400 r.p.m. and with zero rake, chips from the roughing cut will be quite hot, making it advisable to wear long sleeves plus an old glove on the left hand. Also, in all metal turning by the freehand method wear goggles to protect the eyes from flying chips. Be sure that there is no end play in the lathe spindle and that both centers are tightly seated. ★ ★ ★



TURNING SCHEDULE *Early American* CANDLESTICK



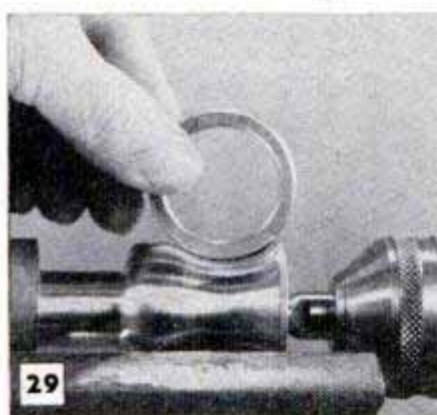
Chuck round stock in collet or a three-jaw chuck and center-drill the end for ball-bearing center



Make layout marks, then rough in stem with a round-nosed chisel. Note use of glove to protect hand



Use a square-nosed chisel to run in shoulder cuts. Be sure to hold chisel firmly on the tool rest



When curve nears the finish dimension, use a 1 1/2-in. ring to check radius of the curved portion



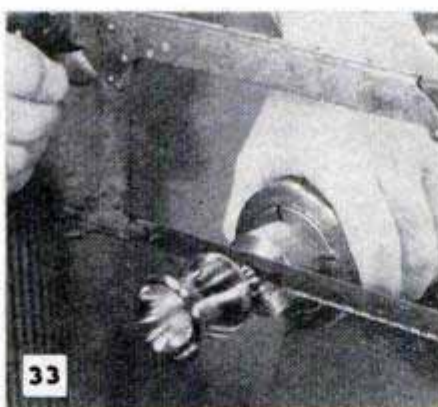
True the curve by using abrasive cloth wrapped around a length of 1 1/2-in. tubing. Use light pressure



Bore the candle socket with an ordinary drill bit first. Then taper with a square-nosed tool



Above, finish top of socket with round-nosed tool. Below, drill stem 5/32 in. and tap 10-24 thread



Above, after polishing cut work free with hacksaw. Below, when finished, handle is cut off as shown



Above, mount socket on wooden form to face off stem. Below, turning of handle on hardwood form



35

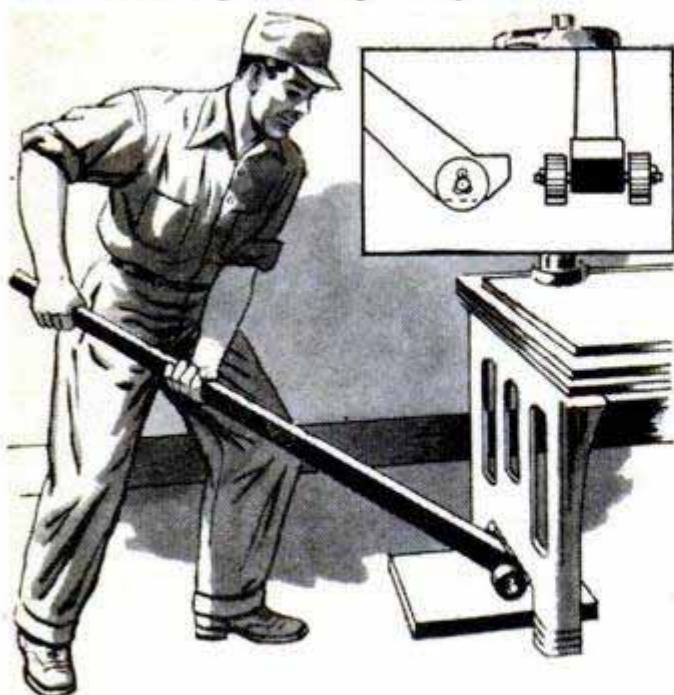


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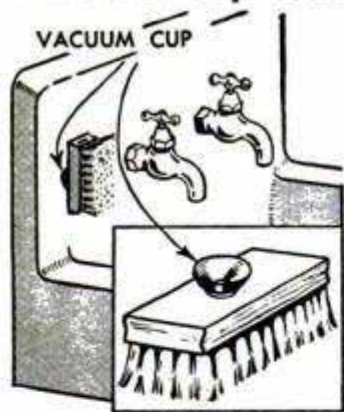
37

Pinch Bar Has Steel Rollers For Moving Heavy Objects



Fitted with steel rollers, this pinch bar is especially useful for moving heavy equipment in shops where crane facilities are not available. It consists of a length of heavy bar steel shaped as shown in the detail, and fitted with an axle inserted through a hole in the lower end of the bar on which the rollers turn.

Vacuum Cup Holds Brush



The annoyance of having a shop hand brush frequently mislaid or lost will be less likely if a rubber vacuum cup is screwed to the back of the brush. This will encourage the user to stick the brush against the sink

backboard when finished. When the brush is replaced, the cup may be removed and used on the new one. Use a vacuum cup having a screw-type base.

Float Arm With Flexible Link Protected in Watering Tank

Livestock cannot break the valve float-ball arm in a watering tank by licking or nudging it if a flexible link is incorporated in the arm. This can be done by cutting the arm near the ball and forming an eye on each severed end. Then a length of small chain is connected to each of the eyes. It may be necessary, however, to bend the

arm downward to accommodate a chain long enough to allow the ball enough play. Harvey Muller, Danboro, Pa.

Floodlights on Wooden Standard Provide Portable Trouble Lamp

Consisting of three floodlights and a bulb with a reflector mounted on an 8-ft. standard, this portable trouble lamp can be used to illuminate large areas of a shop or factory for night work. It also may be used to provide light for picnics and other outdoor activities.



The floodlights illuminate a large area surrounding the standard, while the bulb fitted with the reflector illuminates the area directly under the lamp. The floodlights are clamped to a heavy pipe inserted through a hole in the top of the standard, which consists of two 2 x 4s nailed together and braced on four sides to a cross of 2 x 4s that serves as a base. A crosspiece nailed to the standard holds the coiled electrical cord when not in use.

Grover Brinkman, Okawville, Ill.

Signs From Scrap Materials



Attractive, easy-to-read signs similar to the ones shown, help one orchardist sell apples at his roadside stand. The upper sign consists of letters that are cut from fiberboard or tough cardboard and tacked to thin wooden strips mounted on cross-pieces. With the exception of the black trim, the entire background of the sign is painted red, while the letters are painted either white or black. The detachable sign below is a varnished board on which red cardboard letters are mounted. This sign also has a black trim around the edges. The signs are supported by screw hooks.

Now... Flash Pictures right on the button



Get every picture, always in synch,
with new Kodak B-C Flashholder...

only \$10⁴⁰ (including
Flashguard)

Dependable flash—B-C (battery-condenser) is the most dependable flash system.

Maximum flash power every shot—Built-in condenser stores battery power, fires lamp with full surge at right instant.

Extra-long battery use—B-C extends useful battery life. Takes 22.5 volt battery (extra).

Multiple-flash connection—Accepts extension units.

Easily read exposure guide—On back of reflector.

Comfortable hand grip—Strong, light body has improved bulb socket, positive ejector.

Quickly adjustable bracket—Fastens to camera tripod socket. Adapts to camera size. Cushioned pad holds camera firmly.

Positive flash operation—Electrical contacts are designed for maximum current flow.

"Loss-proof" cord—It's attached permanently.

Inexpensive midget lamps—SM, SF, No. 5 or 25.

Also available in Standard model without B-C. Uses "C" batteries; accepts B-C Flashpack (see below left). \$8.25.

Multiple lighting easy (right)

New Kodak Flashholder Extension Unit, Model 1, with Lumaclad reflector has 20-foot cord and connector, exposure table, bulb ejector, Flashguard. Use up to 2 units with Kodak Flashholders for special lighting. \$11.

50% more illumination and greater camera range with new Lumaclad reflector

Pictures at greater distances—Extra-bright, mirror-surface reflector makes correct exposure easier to obtain.

Even illumination—Extra-deep, tarnish-proof, dent-proof, Tenite reflector assures even lighting without "hot spots."

See your Kodak dealer for wide choice of inexpensive Flashholders for most Kodak and Brownie Cameras.

Prices are subject to change without notice



Convert old flash unit to B-C
Kodak B-C Flashpack replaces two "C" batteries (end-to-end type). \$2.95 (battery extra).



Kodak

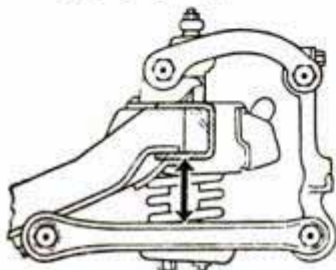


Care and Feeding of Engines

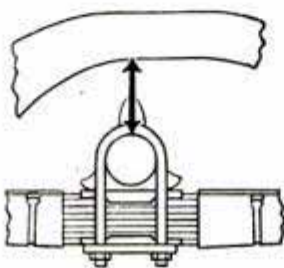
BY S. P. CORP

HARD STEERING

Hard steering may be caused by (1) improper lubrication, (2) uneven tire pressure, (3) brakes needing adjustment, (4) bent steering knuckle, (5) improper camber or caster, (6) frame bent or out of line, or (7) a sagged spring. Points 1, 3, 4, 5, and 6 will need the help of your dealer. Here is how to check for sagging springs:



FRONT SPRING

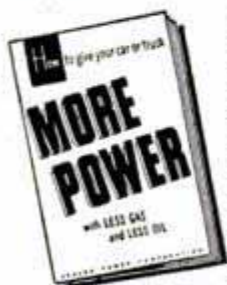
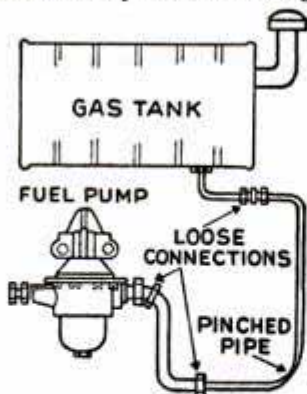


REAR SPRING

Inflate all tires to correct pressure. Make sure nothing in car or trunk causes extra weight on one side. Then check height of each front spring from top of lower control arm to bottom of frame; these should be equal. Then check against a new car, and replace springs if sagged. Check rear springs from bottom of frame to top of rear axle; a difference in readings should be corrected by replacing springs.

HOW TO CHECK FUEL PUMP

One cause of power failure can be lack of fuel due to a leaky or restricted line. Check this by disconnecting fuel line at carburetor, connecting rubber tube to end of line and placing other end of tube in a quart measure. Have someone start engine and run it at idle speed for 45 seconds—for which there is sufficient gas in carburetor. Pump should deliver one pint or more. If it delivers less, look for a leak in pump or fuel lines, or a restriction between fuel pump and gas tank. **CAUTION: Make test outdoors! Use care with gasoline!**



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For your free copy of "MORE POWER, Less Gas, Less Oil," a helpful illustrated manual of car care, just write a card to Sealed Power, Dept. G-9, Muskegon, Mich. And for the finest piston rings made, insist on Sealed Power KromeX Ring Sets, with the famous MD-50 Steel Oil Ring, best for oil control even in tapered and out-of-round bores.

Clinic for Homemakers



As a service to our readers in solving the hundreds of problems pertaining to a home—inside or out—the editors of *Popular Mechanics* invite you to present your problems to The Clinic Editor for help and advice. Address your questions to The Clinic Editor, *Popular Mechanics Magazine*, 200 East Ontario Street, Chicago 11, Ill.

Concrete Repair



Q—The concrete walks from my house to the garage and from the house to the curb have flaked, that is, a portion of the surface has broken loose in irregular patches of varying size. Underneath, the concrete seems to be solid. I've wondered if I couldn't repair the walks by removing the loose flakes and troweling on a cement mix of 50:50 proportions, using side form boards where necessary to get a true edge. Would this be a permanent repair?

R. P., Ga.

A—We'd be a little doubtful about the permanency of the repair you propose, but perhaps it is worth a trial, if, as you say, the concrete under the loose patches is still sound. We are assuming that the patches, or flakes, are comparatively thin and that the thickness of the remaining concrete is at least 2 in. or more. Where the flakes have broken clear to the edge of the walk, and it is likely that many of them have, it will be necessary to install form boards, as you have suggested. Be sure that the form boards are flush with those portions of the walk that are still intact. Then measure the ingredients so that the proportions of 1 part cement and 1 part sharp sand are fairly accurate and add water to give a workable mixture. Wet the surface of the walk lightly. Then trowel the concrete into the depressions and feather the edges of each patch with a brush. An old paint brush with fairly flexible bristles is just the thing for this purpose. Finish with an edger and groover wherever necessary. After the new concrete sets keep it damp for at least five days so that it cures properly. This can be done by covering the surface with heavy burlap or clay and sprinkling with the hose occasionally.

Defective Plaster

Q—Something is wrong with the plastered walls and ceilings in my new home. I have not decorated the walls yet because of this condition. The plaster, in two rooms especially, seems unusually soft and it dusts, that is, breaks into very fine particles when rubbed lightly. Repeated rubbing will remove the plaster to a distance of $\frac{1}{4}$ in. or so below the surrounding surface. What has caused this condition? Will a sealer or undercoater bind the loose particles at the surface so that paint can be applied safely?—B. S., Ill.

(Continued to page 208)

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CHROMTRIM

(Continued from page 206)

A—We would be doubtful about use of an undercoater to correct the condition. If we can judge correctly from your description of the problem, the chalking of the plaster is due to some condition which has delayed the setting of the materials in the plaster itself. This often produces a soft wall such as you describe. Probably the water in the plaster mix was permitted to dry, or evaporate, too quickly at the time of application. This would prevent proper setting of the ingredients, and the surface affected in this manner usually is soft and crumbly and has a chalky appearance. Plasterers often can correct this condition by successive applications of water to the surface in a fine spray. This is continued for several hours, or until the plaster sets.



Painting Block Walls

Q—Just recently I completed a small building with walls of cinder blocks and now I am baffled by the finishing problem, that is, how to prepare the surface for finishing. I'd like to finish the walls with masonry paint, but how does one prepare the porous surface? Should I first plaster the walls with cement mortar, or should I spray the masonry paint directly onto the blocks?

J. M., Utah

A—You have a choice of several methods. Many builders would finish the block walls with a smooth-textured stucco, applying the material directly to the surface of the blocks, or over a wire mesh. Perhaps the simplest and least expensive method of leveling the irregularities and voids in the surface is to apply a wash, or filler coat of cement mixed with sufficient water to give an easy brushing consistency. Lay this on with a white-wash brush, work it into the openings and then brush out to a smooth surface. After the cement wash has set, keep the walls damp for several days to cure the coating. After curing you can apply a masonry paint in any desired color.



Electric Sash Heater

Q—Isn't there some way of building a window-heating unit to prevent moisture condensation on the surface of the pane during the cold winter months? Why wouldn't it be practical to mount a low-heat electrical unit in a housing attached to the lower part of the sash frame so that it would distribute a column of heated air over the whole surface?—H. I., N. Y.

A—If you are thinking of building the units yourself we would not recommend this procedure as we are doubtful if you have considered all the problems involved in the construction. Fire and shock hazards have to be eliminated entirely. Also the problem of uniform heat distribution over large panes would have to be considered in designing a unit that would operate efficiently. Then there is the cost of continuous operation, which would amount to a considerable sum if a number of units were used simultaneously. By this we do not mean to say that it is impossible or even impractical, as a unit of the type you have in mind is already available to homeowners and although we have no performance data at hand we think it is fair to assume that it would operate quite satisfactorily. It is available in various sizes to fit windows of different types. The unit mounts on the window stool and is plugged into the nearest wall outlet. Average current consumption is low.

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What Comes After the Iron Horse?

(Continued from page 123)

the coal-burning turbine? Is it going to be a success?

KERR: The main reason for building it is the interests of some of the roads in burning coal as a fuel.

WILLIAMSON: It would be very nice to be able to build some kind of a sensible, practical, economically attractive locomotive which can burn coal, and hence, take advantage of the three or four thousand years of coal supply that we know we have in this country. No one has come up with that yet on a locomotive. The closest thing to it that anybody ever found was the old reciprocating steam locomotive. In a turbine you can't handle chunks of coal. Even disposing of the products of combustion and the residue are no inconsiderable factors, so it's a much more difficult job to handle coal as a fuel.

Q: *If you could burn a low-cost fuel like coal and get a good efficiency out of it, would that be the ideal situation? If so, would an electric locomotive be the best?*

WILLIAMSON: It is, for many applications. As the density of traffic increases, you have to increase greatly the number of trains per mile of track, and finally you come up to the point where it becomes economically advantageous not to carry the prime mover, but to put the engine over in a power house someplace and distribute the energy electrically.

Q: *Has there been much electrification recently?*

WILLIAMSON: A tremendous amount in foreign countries.

KERR: Most of Holland is electrified now, or shortly will be, and the French are going ahead on a big scale.

Q: *Wasn't there some talk, Mr. Hoppe, about electrifying another stretch out West for the Milwaukee?*

HOPPE: We talk about it every once in awhile. We have about 225 miles between Avery and Othello that is not electrified and with the tremendous amounts of electricity available from water power it might some day prove feasible.

KERR: Remember that with electric power you are getting about 80 percent efficiency.

HOPPE: That is right. And you don't have the same stand-by fuel problem. A big factor in railroad operations is stand-by fuel and that applies to all sorts of power but applies particularly to the steam locomotives. In 1952, our coal-burning steam locomotives performed 22 percent of the switching service yet ate up over 50 percent

(Continued to page 212)

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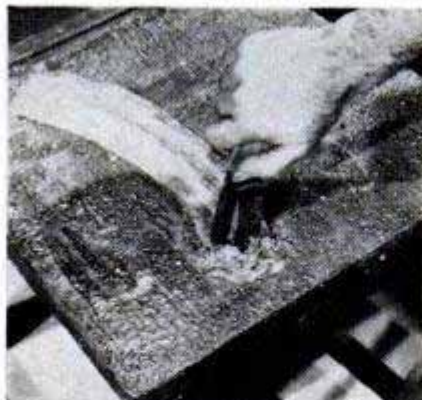
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of the fuel bill. It's all because the steam locomotives now are doing only the "cat and dog" work.

WILLIAMSON: A steam switcher costs an unbearable amount of fuel per hour, mostly just keeping warm. A diesel locomotive only uses fuel, by and large, when it is doing some work.

Q: Then do you think the train of tomorrow will be an electric train?

WILLIAMSON: We think it will be eventually, yes. There are two big factors, the cost of fuel and the cost of maintenance.

Q: What is this Westinghouse Ignitron electric locomotive?

KERR: It is an electric locomotive operating from an alternating-current trolley. In fact, the same direct-current axle motors are on it that we use on the diesels. The Ignitron is a tube which converts alternating current to direct current. Each motor has two tubes. You just use these tubes and the transformer in place of the diesel engine and you take power from the trolley instead of from an engine.

WILLIAMSON: It might be that this is one way the gas turbine can contribute to railroad electrification. A nice way to take advantage of the simplicity of the gas turbines might be to have an automatic gas-turbine power station along the electric railroad every so often.

KERR: Practically all the new locomotives have electric motors on the axles running them. It's just a question of economy, whether it is cheaper to put a diesel engine or gas turbine inside the cab, or to put a power station on land someplace and distribute that power over the wires to those motors.

WILLIAMSON: If you have a railroad where you are running one train a day, you obviously aren't going to get very much of a return on stringing up the trolley wires. When you get down to the point where you have a train every three minutes or every 30 seconds, like you have down in the New York subways, then you have entirely the opposite extreme and it would be simply impossible to carry around on each train the prime movers that would be necessary.

Q: What about Train X? Is it a move in the right or wrong direction?

WILLIAMSON: People started out with something very similar to that years and years ago when the only diesel engines which were available could run only toy trains. By and large, the public acceptance of these small-size trains has not been good in the United States judging by the fact that they all disappeared when engines became powerful enough to pull full-size

(Continued to page 214)

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What are the superior features of this *exclusive* Chrysler system?

Chrysler's revolutionary power steering system reports for duty the moment you start your engine. And it stays on the job every minute your engine runs! It responds instantaneously—unlike other devices, which do not go to work until the driver has applied four or more pounds of steering pressure.

This is the *only* system that enables you to drive hour after hour without steering-wheel weariness. Chrysler's all-the-time steering is so relaxing that many doctors now are willing to allow persons to drive who before could not stand the motion.



Creative Engineering that brings you the good things first. A Chrysler-built De Soto cuts effortless capers in sand and ocean surf at Daytona Beach, Florida. It demonstrates the handling ease and positive safety control of full-time power steering, another Chrysler Corporation "first," now available on Imperial, Chrysler and De Soto cars.

Even the steering ratio has been greatly reduced. Other mechanisms require up to *five* rotations of the steering wheel to turn through a full arc. The Chrysler system requires *only three*. This means faster, safer steering than you can get with any other available system.

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2. **ROUND**—tapered type for circular openings and grooves (6").
3. **HALF ROUND**—for concave or flat surfaces (6" or 8").
4. **TAPER**—triangular shape in regular, slim or extra slim type (5" or 6").
5. **4-IN-HAND**—a combination file and rasp; flat on one side, half round on other (8").
6. **SQUARE**—double cut for slots and other narrow spaces (6").



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trains. In Spain, though, the American-built Talgo trains operate quite successfully.

Q: Is that a prototype of Train X?

WILLIAMSON: Yes. It is the luxury train of Spain.

KERR: I have often thought we are coming to three types of service for passenger business. One type of service is for fellows who ride on expense accounts. They are going to ride bedroom trains overnight. The second is, a service that will compete with a bus by something that undersells the bus, and also get the business from the airplane coach service. I wonder whether something like the Talgo has a place there. The third thing is, if we are going to give fast service, we have to find some way to transport baggage and express and not mix it with passenger trains. One interesting way to give a low-cost service is self-propelled rail cars. There are over 300 rail cars running in Europe today. My feeling is that it's the only way that the railroads could give low-cost passenger transportation. To get people away from busses and air-coach service, if you could move people for two cents a mile, I believe you could build up a lot of passenger business.

HOPPE: Strictly on short hops where you wouldn't have to go into the matter of sleepers.

KERR: Go up to the New York bus terminal and you will find out how many busses are going out of there to Pittsburgh and Buffalo every day, and I believe the railroads, if they could afford to run at that price, could get some of that traffic back.

Q: Do you think that we will see more of these rail cars in service?

HOPPE: Our people at present, I believe, are not interested.

KERR: I appreciate that conditions east of the Mississippi are different from other parts, but you drive over the Pennsylvania Turnpike and see how many busses you pass. You just pass them by the bushel. The traffic is there if the railroads can find some way to do it at a competitive price.

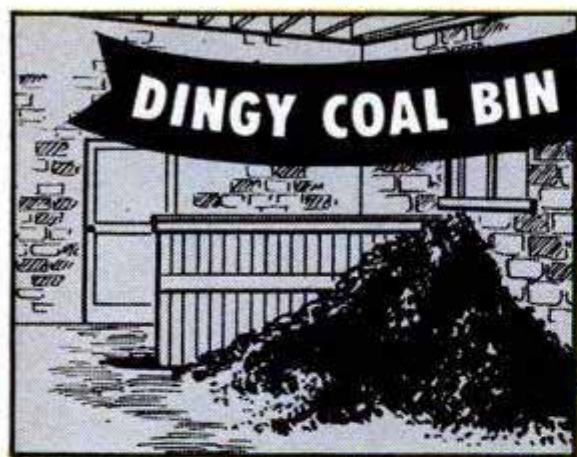
WILLIAMSON: A lot of railroads are operating busses now, and carrying a good deal of their traffic that way in preference to handling it on rails.

KERR: The only way I see that you can do it is with small trains and that is the only way we could capture that traffic. I don't believe you can do it with big locomotive-hauled trains. You can run a bus with one man but it takes three or four men to run one car on the railroad.

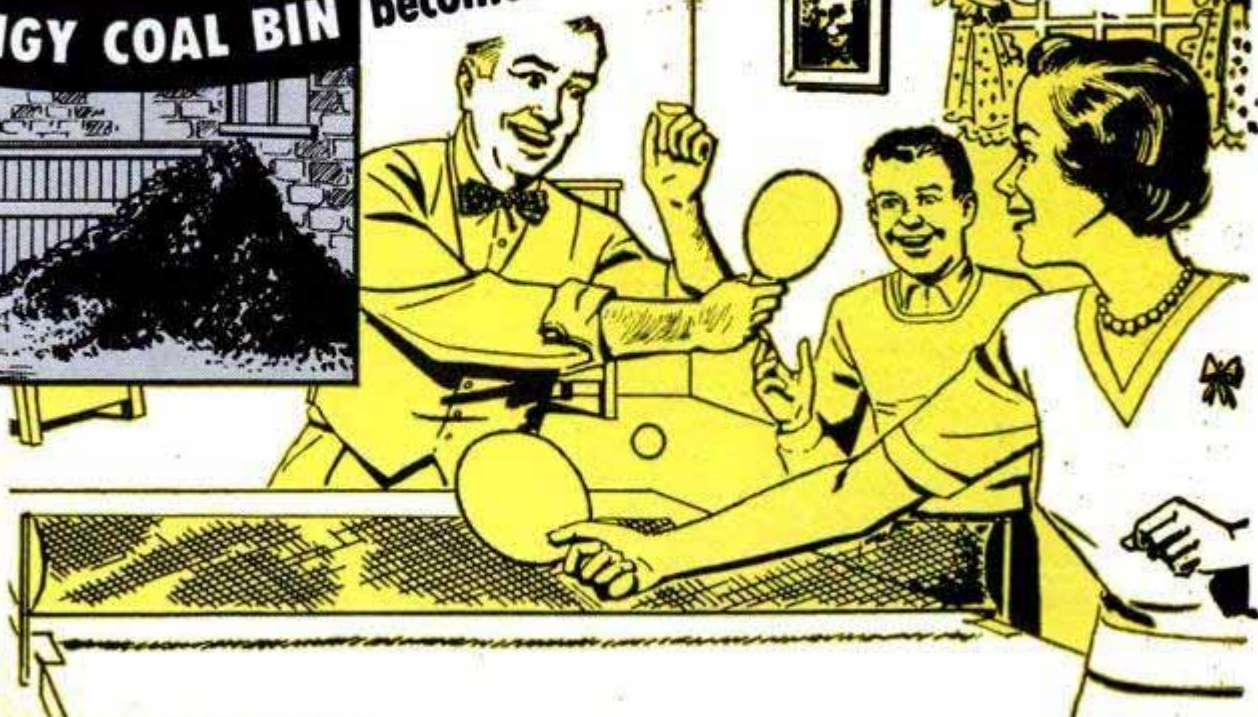
Q: What about monorails? Is there any future for them in this country?

KERR: Maybe something like they are talking about in Los Angeles.

(Continued to page 216)



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Q: What do the proponents of monorails claim that they offer?

KERR: 200-mile-per-hour top speed.

WILLIAMSON: Who wants to run 200 miles per hour? If I am in a great hurry I want to go 600 miles an hour, not 200 miles per hour, and I will take a plane.

Q: Where do they get that extra power to drive a monorail so much faster?

WILLIAMSON: There is no magic monorail horsepower that I know of. Monorails are powered with electric motors just like the subway and they get them up to higher speeds by using plenty of power and by making the cars a good deal smaller. They have, again, gone back to the same things that the railroads did when they had 600-horsepower engines to play with.

Q: Actually, you could do the same thing with a train with small cars?

WILLIAMSON: Yes, that is my opinion.

Q: Like Train X?

WILLIAMSON: Yes.

HOPPE: There is a lot of discussion right now to get some of the trucks off the road by transporting trailers on special flatcars and there is a big operation right now on the New Haven running them into New York. Maybe these smaller trains will come about, not because the railroad wants to handle them, but because they might have to handle them.

KERR: I am not trying to sell electrification here, but if you take any electrified railroad, we could put enough horsepower in it to move trains at any speed. If you have to carry your own prime mover you add a little bit to your job. To me the only advantage in the monorail is cheaper construction. They get a right-of-way practically for nothing, as I understand the Los Angeles situation.

Q: Has any serious consideration been given yet to atomic power for trains?

WILLIAMSON: Yes. I guess we all speculate about that. One of the big factors about atomic power plants is that you have to protect people against radiation. That runs into a terrific amount of extra weight—perhaps three or four times the normal.

Q: Is this a matter of lead shielding?

WILLIAMSON: Yes.

HOPPE: The wheels won't slip!

WILLIAMSON: There isn't any practical sort of atomic power plant for locomotives that we see in the very near future.

KERR: Your grandchildren may see it.

Q: You think such a locomotive would be heavy enough to push the rails into the ground?

WILLIAMSON: Yes, I should think it would!

(Continued to page 218)

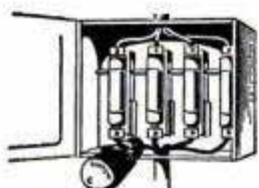
NEW ELECTRICAL TROUBLE SHOOTER

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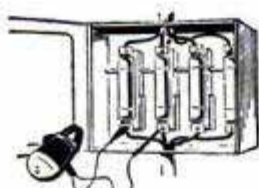
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Measures current instantly without shutdowns or ammeter connections. Just snap the trigger-operated jaws around one conductor (insulated or uninsulated) and you have your reading.



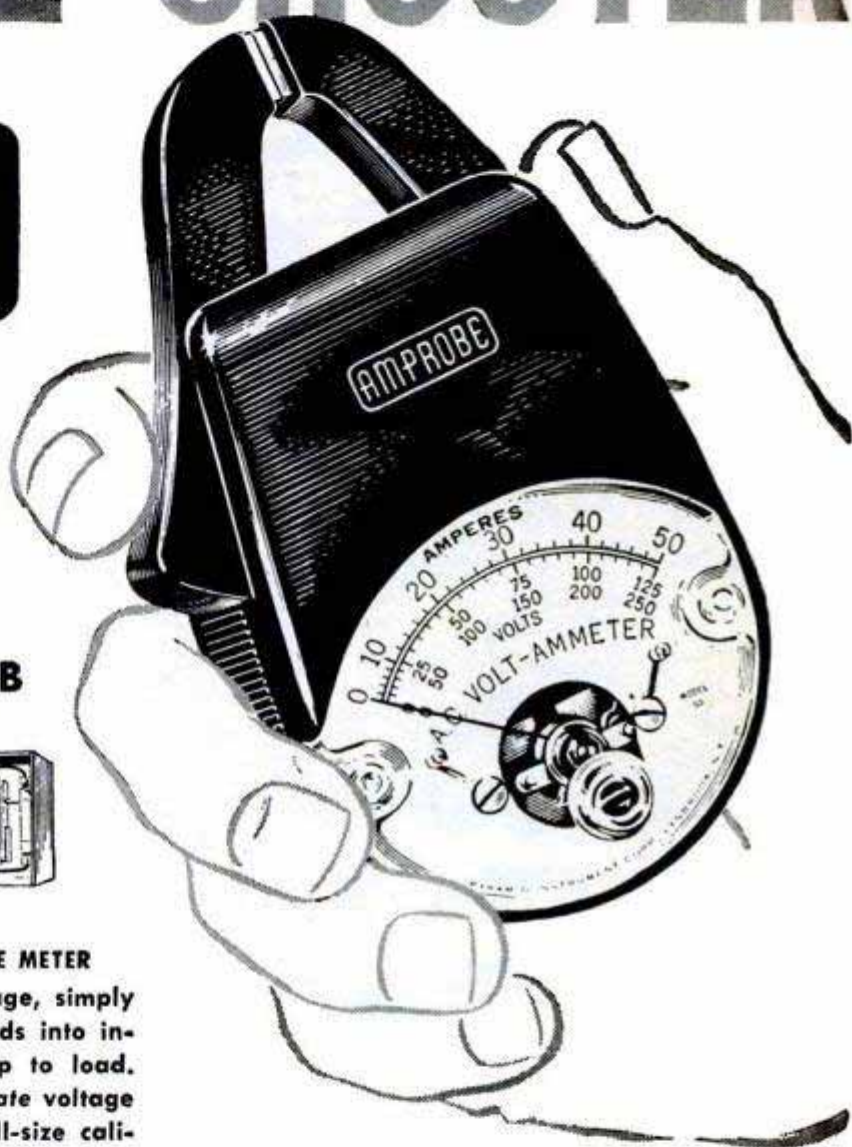
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To measure voltage, simply plug the test leads into instrument and clip to load. You get an accurate voltage reading on a full-size calibrated scale without doubt or guesswork.

*Combines tester ruggedness with instrument accuracy
(within $\pm 3\%$ of full scale)*

NOW EVERY ELECTRICAL MAN CAN HAVE A "SNAP-AROUND"

For only a few dollars more than you would pay for just a voltage tester, you can now own a prized snap-around volt-amp tester. With the Amprobe Junior, you can diagnose service calls faster under actual load, check line voltage, determine if wiring is adequate, balance loads, locate grounds, trace shorts, check motor overloads, etc. Ask your wholesaler for a demonstration, or write for descriptive literature and name of nearest Amprobe wholesaler: PYRAMID INSTRUMENT CORP., Dept. (PM93), Lynbrook, New York. (Export Div.: 458 Broadway, N. Y. 13. Cable: Morhanex).



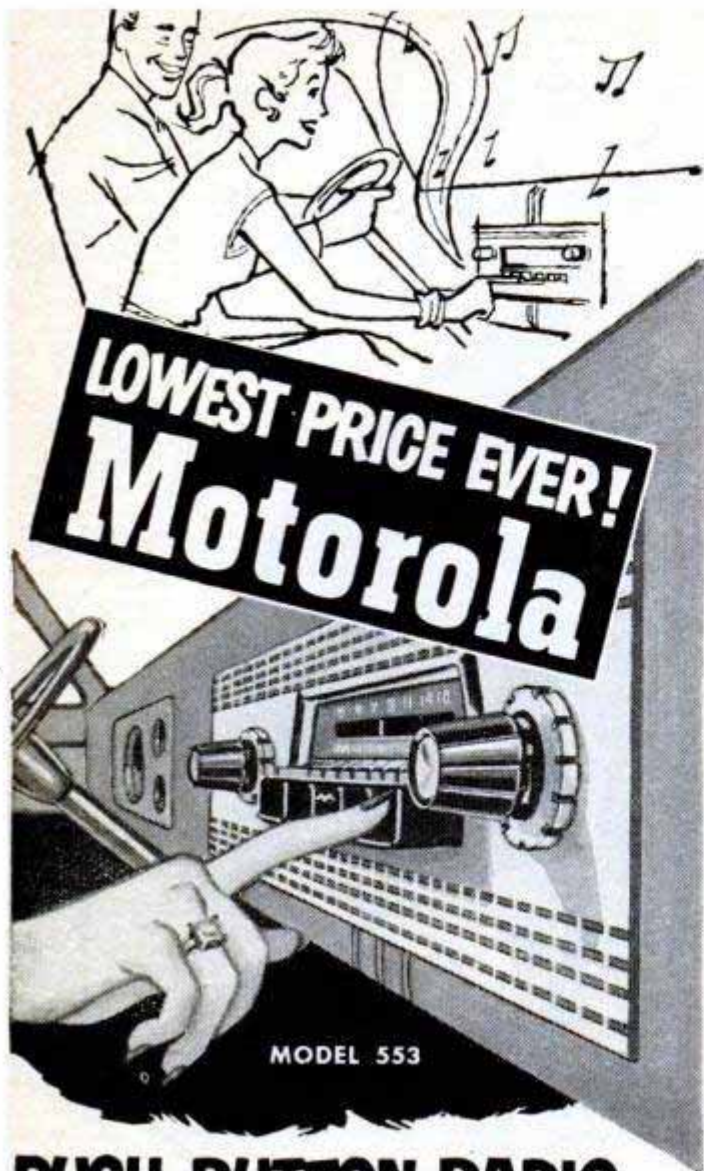
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MODEL "50"	0-50 AMPS AC.	0-125/250 VOLTS AC.
MODEL "100"	0-100 AMPS AC.	0-125/250 VOLTS AC.



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Five station push-to-lock control locks in the station; razor-sharp selectivity; full automatic volume control reduces fading. Low battery drain! So easy to install, it can be put in your car while you wait.



Q: Would stationary power plants be one answer?

WILLIAMSON: Absolutely. If we can get limitless electric power from some atomic source, the railroads will feel it in greatly increased electrification.

KERR: It is just a question of what's the cheapest way to get power to the traction motors, because as long as you use electric drives and put a given amount of horsepower back of those drives, they are all going to move trains in the same way.

HOPPE: Those motors don't care where that power is coming from. You could get enough men on a hand crank and turn a generator.

Q: Can you pin that down any further? What do you think the train of tomorrow will be? Will it be an electric train?

KERR: I will say this, and I think these fellows agree with me, that an electrified railroad is still the best way to run a railroad that we have ever known. If you make a modern railroad with a trolley, you can do more with it than you can with any self-propelled locomotive because you have an unlimited power source back of it. It might cost you more if you don't have the traffic to justify it, but you can make better schedules, you can pull bigger trains, you can pull them faster with an electrified system than with any other. ★ ★ ★

Precut Wood Pictures Assembled from Kits

No experience and no tools are needed to assemble inlaid pictures in wood with a new kit which furnishes all materials. The veneers forming the picture have been selected and sawed; all that remains is to glue them to the panel provided. Borders, fast-setting glue, crack filler, sandpaper, master drawings and complete instructions are included. Five different outdoor scenes are available.



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won't black out!**

*Ordinary lamp blacks out when
the lens is cracked or broken*

*Auto-Lite Bull's Eye keeps burning
even when the lens is cracked or broken*

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In addition the Bull's Eye concentrates more light into the Main Driving Beam for clearer, brighter night driving.

Tune in "Suspense!"... CBS Radio Mondays... CBS Television Tuesdays

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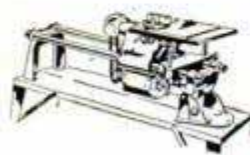
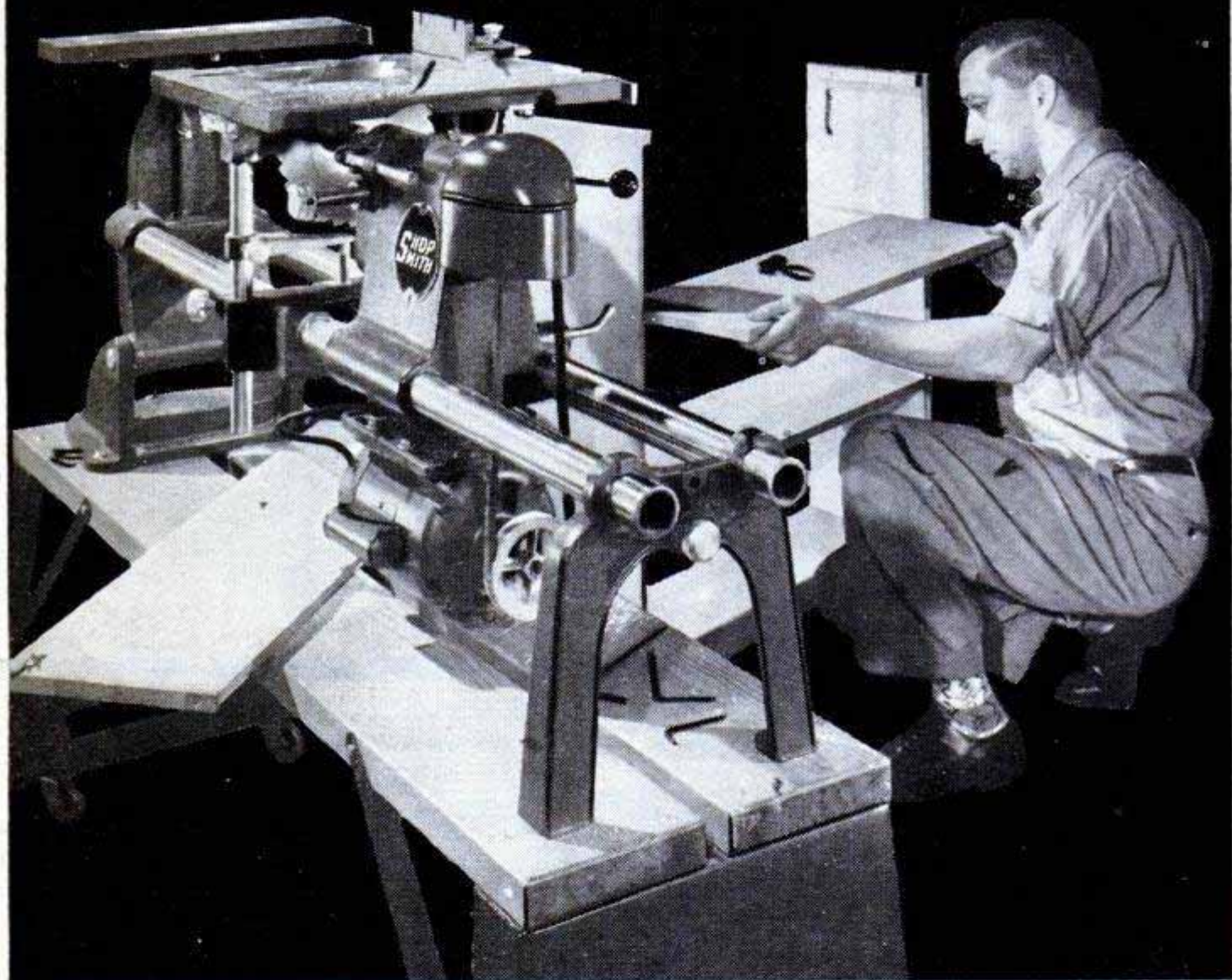


Concentrates MORE Light into the Main Driving Beam

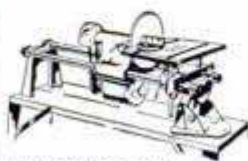
Ask for
AUTO-LITE
Bull's-Eye
METAL BACK SEALED BEAM LAMP

SEALED TIGHT—STAYS BRIGHT ... Guaranteed to burn even when lens is cracked or broken

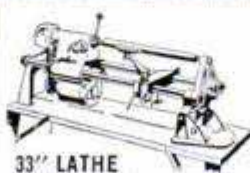
How can you go wrong?



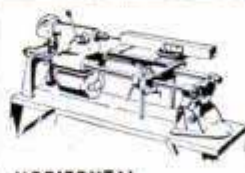
8" CIRCULAR SAW
has 48" blade-to-fence capacity! With capacity like this you can easily saw big doors, screens, storm sash.



12" DISC SANDER
handles room-length boards. Disc feeds into work for greater accuracy, speed, safety, and precision finishing of duplicate parts.



33" LATHE
turns work up to 15" dia.—4" more than most lathes. Sliding headstock puts work within easy reach; swiveling tool rest slides parallel to work.



HORIZONTAL DRILL PRESS
is especially handy for doweling and drilling large, bulky work. No jigs required—just lay work flat on table.

VERTICAL DRILL PRESS

is both table model (table to chuck, 27") and floor model (floor to chuck, 55"). Jacobs key chuck takes drills from 5/64" to 1/2" dia.



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A PRECISION TOOL! Blade-to-fence settings on the SHOPSMITH Circular Saw are so accurate, you can shave strips of wood as thin as the pages of this magazine—and you can do it quickly, time after time. The Disc Sander feeds *into* the work, and can be stopped on a hairline. The Vertical and Horizontal Drill Presses have built-in jigs, unique micro-settings. Centerless-ground ways are stress-tested at over a ton to assure rigidity and accuracy in Lathe and other operations.

A HIGH-CAPACITY TOOL! The Circular Saw cuts 8' panels in half, into two 4' sections... the Disc Sander and Horizontal Drill Press can handle *room-length* boards... the Lathe turns work 33" long, 15" in diameter... and the Vertical Drill Press can drill to the center of a 15" circle.

A HIGH-SPEED, POWERFUL TOOL! You can turn out duplicate parts by the dozen on SHOPSMITH, in just a few moments. And there's power to spare for most uses in the heavy-duty $\frac{1}{2}$ hp. motor, but if you do need more, you can get it with the special SHOPSMITH $\frac{3}{4}$ hp. motor.

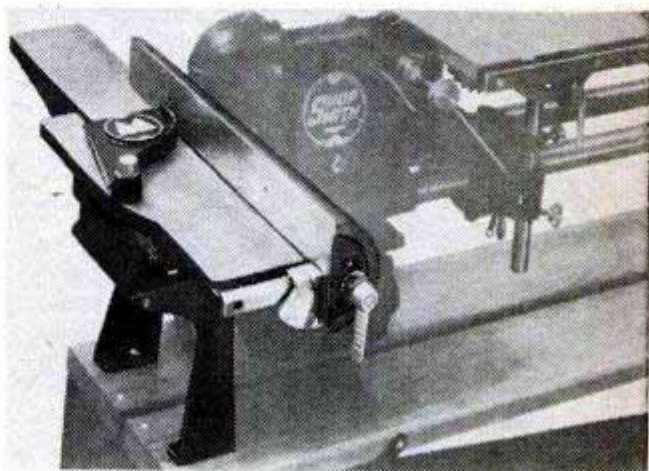
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WHEN your battery cable terminals are corroded, your battery uses up much of its power to force its necessary electrical energy through "juice"-stopping corrosion. This makes for harder starting . . . less efficiency throughout your motor . . . shortens the life of both battery and battery cables.

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Bowes "Seal Fast" battery cable terminals positively will not corrode, and are specially engineered to fit the battery posts snugly, assuring longer cable life and full power from your battery. Stop battery cable trouble before it begins . . . and . . . increase the life of your battery. Your Bowes dealer can supply you.

BOWES "SEAL FAST" CORP., INDIANAPOLIS 7, IND.
BOWES PACIFIC CORP., RIVERSIDE, CALIF.

Hens Never Had It So Good

(Continued from page 75)

a vast 200 by 60-foot cinder-block house, ventilated, thermostatically heated in winter and rigged with automatic feeders. Some 15,000 birds at a time can be raised here in comfort. When they're old enough they move out to the range—50 acres of rolling pasture dotted with rows of sheds. That's enough territory so Schultz can use a third of it at a time, rotating his batches from one area to another each year.

"That gives each range a couple of years to clean and recondition itself naturally," he points out.

Daily feeding of some 30,000 chickens that are roaming all over 17 acres takes some doing. To solve the problem, Schultz found an old manure spreader. Grain goes in the cart. The chain belts on the bottom push just the right amount of grain over the tailboard so he can trail a thin ribbon of feed around the range.

At one end of the range Schultz starts his tractor. That's the signal. From a quarter of a mile away a great wave of chickens surges toward the noise, flapping wings, scooting along the ground, half-flying over bushes. Within seconds the spreader and tractor are nearly submerged by birds. Schultz' young son and daughter chase the pullets from under the wheels and jump aboard as the tractor gets under way. As fast as the grain hits the ground it is covered with birds.

After their range tour the hens are ready for shipment to Raskin's de luxe houses. Men go out at night with crates, load them and bring them to a regular production-line receiving center. Two men uncrate the birds. Raskin stands by with a needle to give each a shot against Newcastle's disease and a vaccination for pox.

The happy hens undergo a regular medical program throughout their lives. At one day old they are shot with a Newcastle virus injection. Between four and eight weeks they get bronchitis nasal drops. At 16 weeks there's a Newcastle booster and a pox vaccination. Aureomycin food stimulator is handed out when needed. Infections like coccidiosis are controlled by sulfa.

Chick Raskin figures that mechanization will have a tremendous effect on egg production in the future.

"Without it, a farmer has to get a fairly high price for his eggs or lose his shirt," he explains. "Push-button egg farming permits a man to rotate and plan his layers so one batch follows another, maintaining a stable level of production the year 'round.

"That's the way I'd like to see it—steady and comfortable."

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Use a special paint tray. Line tray with layer of newspaper taped down (for easy cleaning). Next hook legs of tray on ladder before pouring paint.



How do you wet the roller? Dip the roller into edge of paint, roll back and forth until evenly coated. Now you're all set to paint.



Application is easy! First stroke should be upward. Work small section at a time. Devoe Wonder-Tones paint rolls on like magic, dries in 20 minutes!



Special roller stunt for floors! Simply attach roller handle to a broomstick. Use Devoe Floor and Deck Enamel . . . dries fast, stands up under hard wear.



Simple cleanup! Put roller in jar. Pour in turpentine (for oil paint); water if you're painting with Devoe Wonder-Tones. Shake. Rinse with soap, water.

If you are painting the outside of your house, use Devoe Wonder-1-Coat House Paint . . . gives 2-coat beauty and protection in just one coat, cuts repainting time and costs practically in half. Your Devoe dealer (in Classified Phone Book) will help you with all your painting needs.

DEVOE
PAINT

New Seven-Seas Scout Has Hand-Wound Coils

(Continued from page 144)

type can be employed for local reception. Test the set first with the broadcast coil and headphones. Turn set on with volume and regeneration controls fully open. Permit the tubes to warm up for about 1 minute, then rotate the band-set condensers C2 and C4. You will hear a series of whistles as the 2-gang condenser is rotated, each whistle indicates that you are tuning past a station and that the set is oscillating. Reduce the amount of feedback by turning the regeneration control R2 counterclockwise until the whistles disappear. This position will enable you to bring in the most stations with greatest volume. If the volume is too loud reduce it with the volume control R6. Now tune the set so that no station is heard and rotate the regeneration control slowly from a minimum to maximum. Notice that at a certain critical point you will hear a "plop," or slight hiss. This is the point of oscillation. The most sensitive point for broadcast and other "voice" stations is just before oscillations begin. For code stations with short-wave coils, the most sensitive setting is the point of oscillation. You will find it necessary to re-adjust the regeneration control for maximum sensitivity with various settings of the band-set condenser. It should be possible to make the set oscillate over the complete tuning range of the band-set condenser. In order to do so, however, it may be necessary to reduce the coupling to the antenna by opening the antenna-coupling condenser C1 a few turns with a small screwdriver. If the set does not oscillate over the complete range, move the two coil windings L1 and L2 closer together or, as a last resort, add a few turns to the small winding, L2.

With the short-wave coils in the set, tuning is more critical. Here is where the band-spread condenser C3, spreads out a portion of the band and makes it possible to separate these crowded stations more easily.

Short-wave listening is best in the early evening when most stations are on the air. Weather conditions play a large part in short-wave reception. Some evenings you will find it difficult to tune in any short-wave stations, while on others the various bands will be crowded with interesting listening for the student ham and the short-wave listener.

Detailed student material list R-422 is available from Popular Mechanics Radio and Electronics department upon receipt of ordinary letter postage. ★ ★ ★

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Hurricanes on Leash

(Continued from page 136)

authorized to use the lab's seal of "hurricane approval."

In the Miami area the storm-testing idea was mainly prompted by manufacturers of the new glass jalousie window. This window, using adjustable glass louvers for ventilation, was a new development. Builders, architects and insurance men were skeptical of how well the jalousies would stand up to hurricanes. Manufacturers called on the hurricane-testing laboratory to prove their product.

In the subsequent tests on all types of windows, glass jalousies proved their worth. In a blowing rain the overlapping strips of glass hold a film of moisture between the closed surfaces, thus forming a good seal against further penetration of water and air.

Florida's storm-testing lab tests just about anything. It has already conducted a full-scale study on what happens to television aerials when hit by hurricane winds.

The roof of the test building is rigged on hinges, so that with a couple of tricky adjustments it can be slanted up into the wind at any angle. In this way all kinds of roofing materials have been tested. When a product falls down in one of these tests and can't take the rough treatment of hurricane weather, engineers from the university analyze what they believe the trouble to be.

Technicians have worked out a number of standard tests for different building parts, but they want it known that there is nothing rigid about their methods. They are always eager to tackle any special problems for manufacturers. They'd like to do more testing on things like waterproofing compounds for cement block and other construction material; try out various paints to find out how well each keeps the water out and adheres in a storm; test automobiles in hurricane conditions.

A big field that hasn't had much work done on it, is the testing of human stamina to discover how much storm a man can take and still do a job. Electric linemen, Red Cross workers and police have to stay on their jobs to the last possible minute. How much wind can a man walk in and stay on his feet? What clothing will protect him? What equipment can he manage?

There are still a lot of unanswered questions stumping the experts. But until recently there weren't any experts on problems like these; so most of the problems shouldn't be long in the solving. In fact, as the saying goes, a good many are already in the wind. ★ ★ ★

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SEND FOR IT — ONLY 10¢

Starrett "Tools and Rules" Book shows the right tools for any measuring job. 50 pages, 100 pictures, helpful reference tables. Address Dept. AP

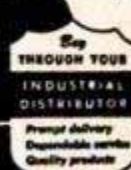


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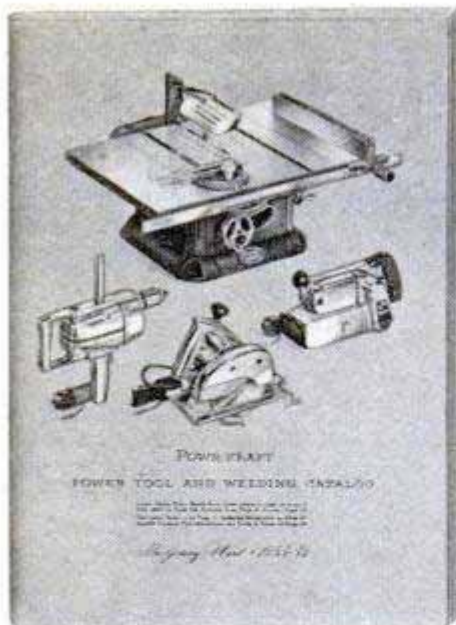
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With Foot Control**

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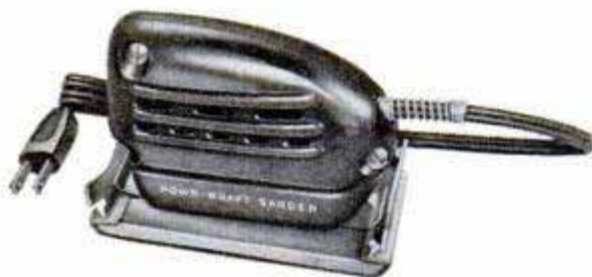
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The Owners Report on the Studebaker

(Continued from page 102)

in the dark."—Kearny, N. J., bookkeeper.

Owners of V8 models liked the acceleration ability of their cars, but like Champion owners, did not praise the body's structural rigidity. There were also many complaints of hard steering.

Although body styling is the main feature of discussion in the 1953 Studebakers, owners did discuss economy also. The average Champion owner reported gasoline mileage of 21.01 miles per gallon in the country and 18.3 in the city. Commander owners reported an average of 18.2 in the country and 14.1 miles per gallon in the city. Overdrive owners get about 2.3 miles per gallon more than those with Automatic Drive.

And now for my own test: I drove the Studebaker Commander V8 Regal Starlight coupe from the factory at South Bend, Ind., to Los Angeles—via Indianapolis, St. Louis, Kansas City and Albuquerque—a distance of 2530 miles, which included some cross-country road testing in the desert.

Studebaker has something besides styling in their new model and that is an excellent driving position for long-distance traveling and a car that far exceeds any previous Studebaker in handling.

The 232.6 cubic-inch, 120-horsepower V8 engine, with a 7.0:1 compression ratio is "oversquare" in that the bore (3 $\frac{3}{8}$ inches) exceeds the stroke (3 $\frac{1}{4}$ inches), lessening piston travel and making for long engine life. The engine has excellent pulling power and good acceleration.

The sleek lines of the new Studebaker and the low center of gravity undoubtedly improve handling. The top of the car is so low that many feel there must be little underneath road clearance, but Studebaker's clearance is average for a modern car. There is excellent curb clearance at the bottom of the door, which measures 12 inches from the ground.

The Commander is fast and maximum speed by speedometer (which like most is fast—by almost six percent) was 103-105 miles per hour. Speeds of 90 and 95 could be maintained for mile after mile. I would rate the car in handling as one of the three best mass-produced cars in the United States.

The low body lines undoubtedly assist in increasing top speed and, as one sidewalk "kibitzer" in a small Kansas town remarked, "It doesn't 'cut' much wind"—and I think that about sums up the fine aerodynamic qualities of the new Studebaker.

(Continued to page 234)

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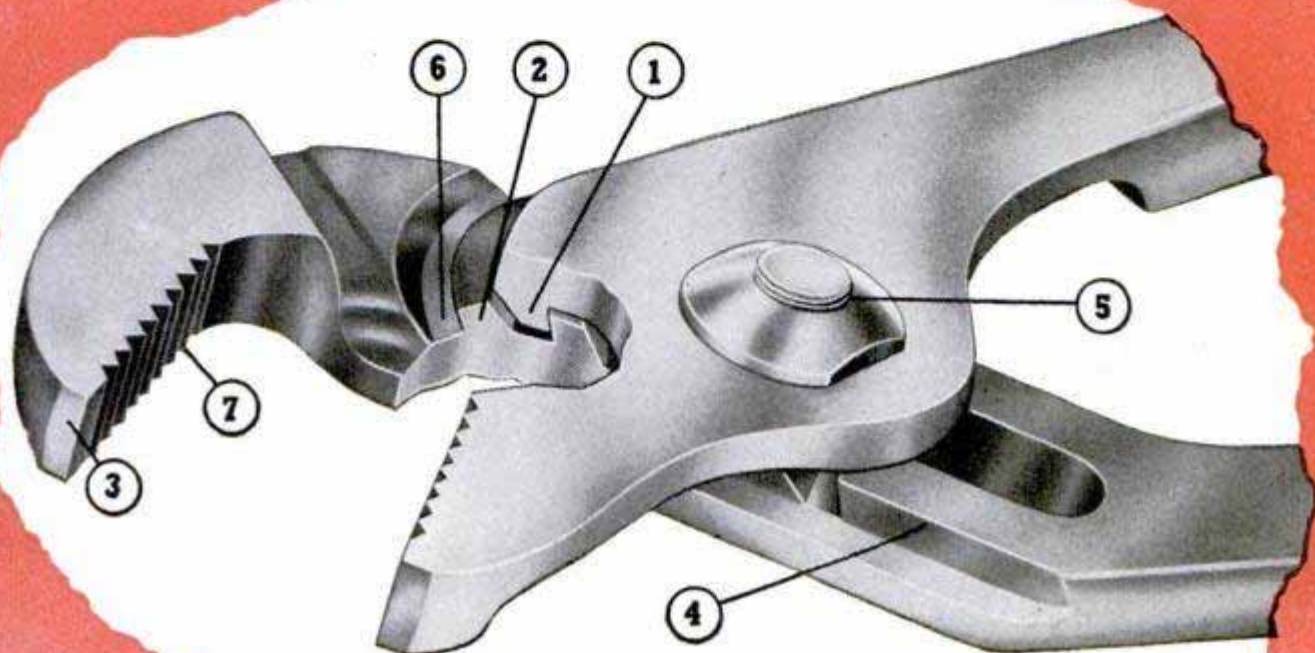
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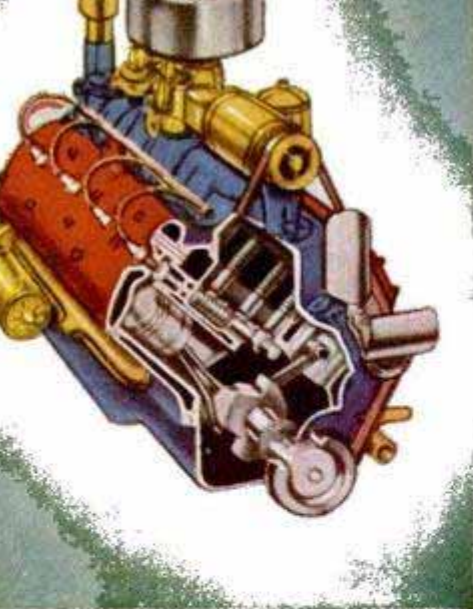
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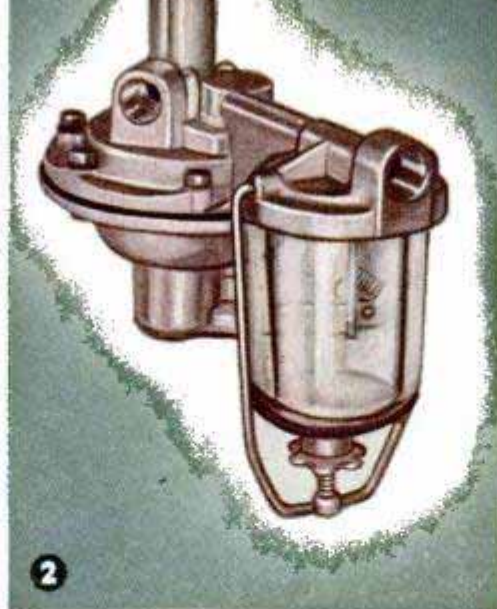
CHAMPION DeARMENT TOOL CO.

MEADVILLE, PA.

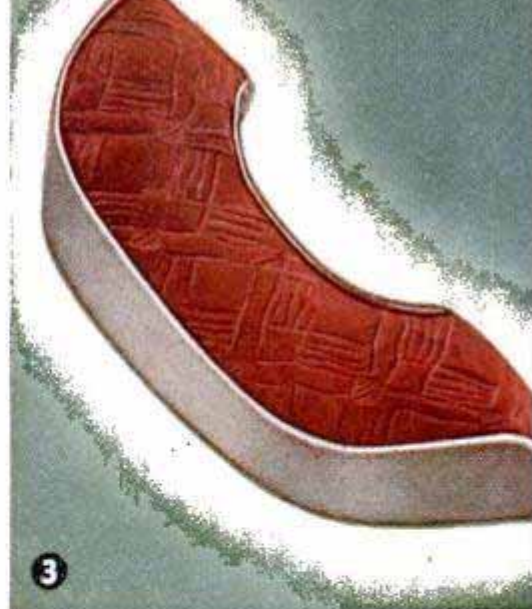




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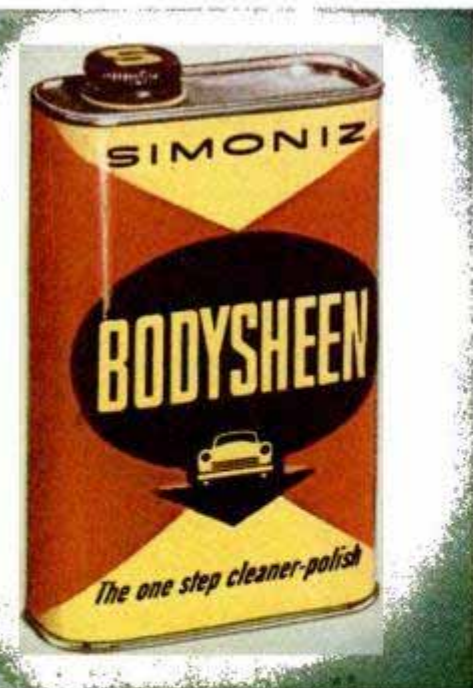


Bright, new arm rest covers snap on quickly, without removing the arm rests. Made of beautiful quilted Vinyl plastic. Choice of 5 popular colors—yellow, gray, blue, green or red—to harmonize with any seat cover or interior trim. Attractive pin-point Vinyl trim. Pr. (2N2899-2913) **\$.1.59**

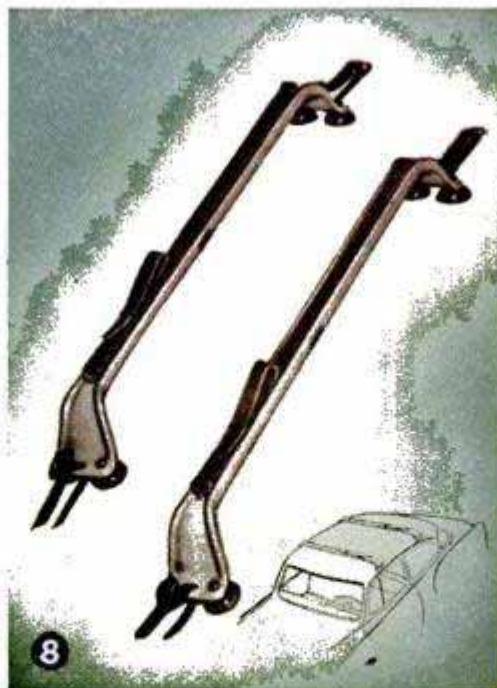


New Power...New Beauty..

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No need to wash your car! New Simoniz Bodysheen cleans and polishes, in one easy simple step. Wipe Bodysheen on, then wipe it off and see your car gleam. Brings out natural brilliance, enriches colors. Gives your car a tough, long-lasting, weather-resistant finish. (3P7113) **98c**



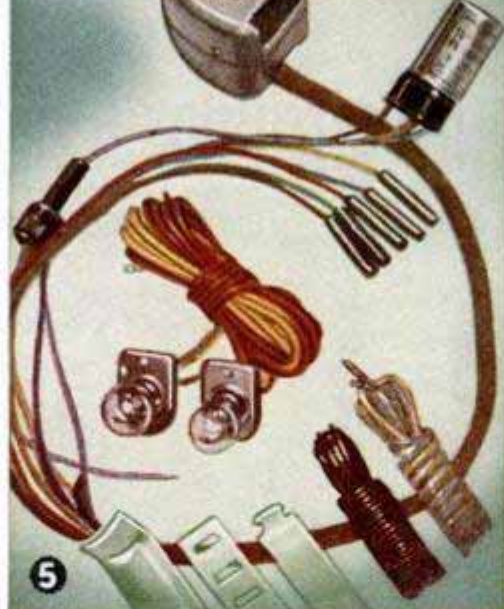
"Reddi-Rak" Car Top Carrier — new advanced design, complete, assembled, ready to install. Adjustable—mounts on any car top in a minute. Big 3 1/4" suction cups can't slip. Heavy web straps anchor to rain guard—hold big load safely. Heavy gauge steel. Pr. (C5232) **\$7.95**



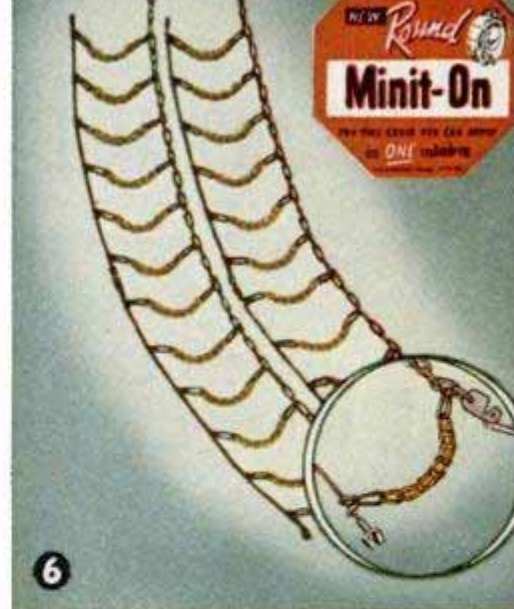
Drednaut Hydraulic Jack takes work and danger out of tire changing. Easy wrist-action lifts any car. Twist—it's down, safely and smoothly. Precision built to meet most severe transport service requirements. 7" high—raises to 14 1/4". Pumping handle included. (A6188) **\$11.15**



Don't be stranded by a worn-out fan belt. Replace now with a Western Auto extra-quality fan belt. Inner core of endless cable cords. Tough rubber cushion reduces heat, assures long life, cooler-running performance. Can't warp, slip, or stretch. Guaranteed fit **65c to \$1.95**



Reduce driving hazards with this turn signal set. Automatically returns to neutral position when turn is completed. Blends with dash and steering wheel. Flashing red indicator light on switch. (2LR6176) **\$6.45**
Wiring kit, with all installation material. (2LR6177) **\$2.98**



"Minit-On" Tire Chains — so revolutionary you can put them on in just *one* minute. Install anywhere—in snow, on ice, or on a hill. Not "snap-ons", but complete, patented chains with adjusters. Tough, wear-resisting links. Plastic coat sleeve protectors included. Pr. from **\$13.95**

New Safety For Your Car At Western Auto

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NOTE: Western Auto Associate Dealers own their stores and set their own prices, terms and conditions. Prices may vary due to difference in local conditions. (PM93)



Guaranteed to fire in oil. Aldor spark plugs have bi-metallic thermostat control that keeps spark plug always at peak efficiency for smoother running, easier starting. Adjusts to any heat range requirement automatically. Special non-burning electrodes. (2N1105-8) **\$1.95**

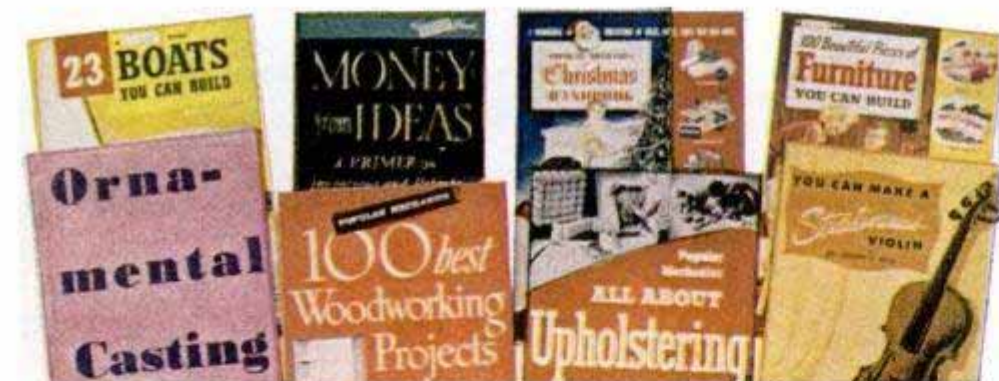


Add new beauty and style to your car's interior, and protect your floor mat from excessive wear with these handy rubber utility mats. Also has many uses around the house. Easy to clean. Black, blue, red, or green. 17" x 17" (2N1105-8) **Ea \$9c**



Top quality brake fluid meets S.A.E. standards. Permanent-type, for all cars and trucks. Mixes with any fluid. Perfect all-weather performance—no loss at extremely hot temperatures or freezing at cold temperatures. Quart (S5555) **\$1.09**

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Popular Mechanics Press
200 E. Ontario St., Chicago 11, Ill.

TWO NEW CRESCENT SCREWDRIVERS FEATURE TENITE HANDLES



● Here's typical Crescent quality in a new line of plastic handled screwdrivers! Blades are hot forged and hardened full length. Then blade and handle are assembled under pressure so blade will never loosen. Finally, each screwdriver is individually tested to insure blade tips that will not break or twist.

You'll recognize these new Crescent Screwdrivers by their distinctive blue-colored Tenite handles, with soft-edged knurling that assures a sure grip without blistering the hand. Two patterns for slotted screws . . . one for Phillips head screws . . . in the sizes listed below.

K1300 and
K1500 series

K1700 series

STANDARD PATTERN (K1300 series)

5 sizes, 3" to 10" blade lengths.

CABINET PATTERN (K1500 series)

4 sizes, 3½" to 8½" blade lengths.

PHILLIPS POINT (K1700 series)

4 sizes, 3" to 6" blade lengths.

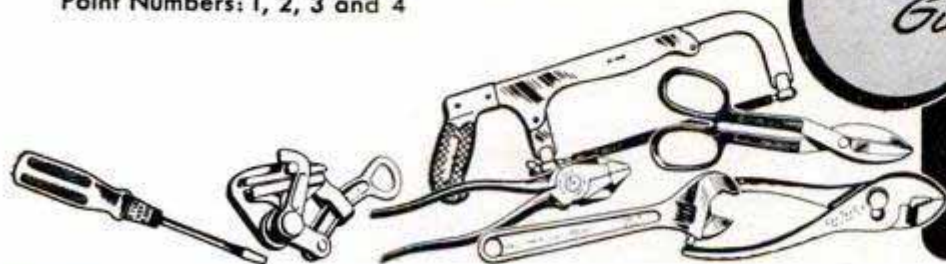
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*Sign of the Artisan
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HOW HANDY YOU CAN GET!



SPEEDY RIVETS

... Do jobs you never thought you could do yourself... fasten cloth, leather, paper, plastic sheeting... repair luggage, work-clothes, straps, dog collars... ideal for craftwork, too



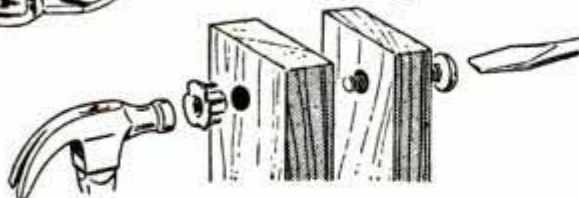
... quick, secure, permanent. Simply punch a hole in each part to be fastened, push rivet together through holes, place on firm surface and swat with a hammer. Gilt, nickel, black, brown finishes. Large or small sizes.

TEENUTS® steel threads in wood

Industry proven TEENUTS, now available for home handymen... provide flush mounting without



counter-boring. Excellent for new work or repairs. Ideal for wood to metal applications and



where old screw holes have become useless. You simply drill hole size of TEENUT barrel, hammer home TEENUT and its steel prongs provide rigid, permanent anchorage. Same size hole for bolt. Complete line to fit standard bolt sizes.

AT HARDWARE COUNTERS EVERYWHERE 15¢

THE **DOT** LINE

3229 South Ashland Avenue, Chicago 8, Illinois

1953 STUDEBAKER SPECIFICATIONS

ENGINE

	Champion	Commander & Land Cruiser
Type	6-cyl., in-line, L-head	8-cyl., V-type, OHV
Bore and stroke	3.0 x 4.0 in.	3 3/8 x 3 1/4 in.
Piston displacement	169.6 cu. in.	232.6 cu. in.
Compression ratio	7.0:1	7.0:1
Brake horsepower	85 at 4000 r.p.m.	120 at 4000 r.p.m.
Transmission	3-speed unit standard. Overdrive or Studebaker Automatic Drive optional extra.	

CAPACITIES

Oil	5 qt.	6 qt.
Water (with heater)	11.5 qt.	18.75 qt.
Gasoline	18 gal.	18 gal.

GENERAL

Steering ratio	19.5:1 or 20.0:1	24.0:1 or 33.8:1
Steering wheel, lock to lock	4 1/4 turns	4 1/4 or 5 1/4 turns
Turning diameter	38.5 ft. to 39.5 ft.	40 ft. to 41 ft.
Brakes	Hydraulic with riveted linings.	
Tire size	6.40 x 15	7.10 x 15
Shipping weight (4-door sedan)	2745 lb.	Commander 3095 lb. Land Cruiser 3180 lb.
Wheelbase	116 1/2 in. (sedans) 120 1/2 in. (coupes)	116 1/2 in. (sedans) 120 1/2 in. (coupes)
Tread, front	56 1/16 in.	56 1/16 in.
Tread, rear	55 1/2 in.	55 1/2 in.
Length, over-all (4-dr.)	198 3/16 in.	198 3/16 in.
Length, over-all (hard-top)	201 1 1/16 in.	201 1 1/16 in.
Width, over-all (4-dr.)	69 1/2 in.	69 1/2 in.
Width, over-all (hardtop)	71 in.	71 in.
Height, over-all (4-dr.)	60 1/2 in.	61 3/16 in.
Height, over-all (hard-top)	56 5/16 in.	56 5/16 in.
Road clearance	7 3/16 in.	7 3/16 in.

INTERIOR DIMENSIONS

Front-seat width	59 1/4 in. (hip room)	59 1/4 in. (hip room)
Rear-seat width	59 1/2 in. (hip room)	59 1/2 in. (hip room)
Headroom, front	35 3/4 in.	35 3/4 in.
Headroom, rear	35 1 3/16 in.	35 1 3/16 in.
Legroom, front	44.0 in.	44.0 in.
Legroom, rear	40.0 in.	40.0 in.

Improved spring suspension means less floating in the front end than in previous models. Riding comfort is better than ever. There is very little rebound, even when hitting bumps at high speed. The low body and low center of gravity enable you to take corners at much faster speed than in previous models with less roll.

Too much movement of the steering wheel still is required to suit me, yet the variable ratio of the Studebaker steering gear offsets this objection somewhat. It requires 5 1/2 turns of the steering wheel from lock to lock on the Commander test car which did not have power steering. Studebaker power steering (optional on all models) is mechanical and offers quicker steering, requiring only 4 1/4 turns from lock to lock. This is a better ratio for high-speed cornering and mountain driving.

My gas mileage was above average for the size and weight of the test car. You can run a Studebaker V8 or Champion all day long on regular gas with perfect performance, thus saving on fuel costs.

Traction on the new Studebaker seems better than on previous models and yet I cannot tell you why. I drove on some sandy back roads and in mud and the rear wheels

(Continued to page 236)

We "Deep Freeze" Ford Batteries to save you money!



Ford Batteries are made to start your car at temperatures much colder than you may ever know. And that's only one reason why they are your best battery buy—

They're tested to go at 30-below! Ford Batteries are tested to start at temperatures that cold—and to stand up in desert heat! They're also shake-tested, dust-tested, cycled from full charge to full discharge 275 times! They must prove they can "take it" before being approved for manufacture.

Ford Anti-Freeze will save you money, too!

Ford Permanent Anti-Freeze will last all winter in a properly operating cooling system. It contains a rust inhibitor and exceeds the Bureau of Standards' safety requirements. Ford Regular Anti-Freeze gives safe, dependable cold-weather protection to Fords at low cost. Tests prove it gives more anti-rust protection than many similar types.

Keep your Ford all Ford

Genuine Ford Parts are available at all Ford Dealers and the select-ed independent garages where you see this sign.



for some reason seemed to have more traction than on previous Studebakers I've tested.

The self-centering brakes appear to have less fade than the ones used on previous Studebakers and there is more cushion on the brake pedal. A different type of brake lining is responsible. Even in high-speed driving and while abusing the car in off-road tests and over mountainous terrain, there was little brake fade. The wide brake pedal is an excellent feature and it is well located.

No leaks developed in hard rain storms. Outside of two loose, rattling hub caps, few rattles and squeaks developed. This is unusual in any new design.

The instrument panel, in some respects, resembles those in airplanes. Lights, starter and heater are controlled by toggle switches. The indicator gauges, as well as the speedometer and clock, are shrouded in four separate housings in the Commander. Vision of all instruments is unobstructed, as the horn ring extends only below the center of the steering hub.

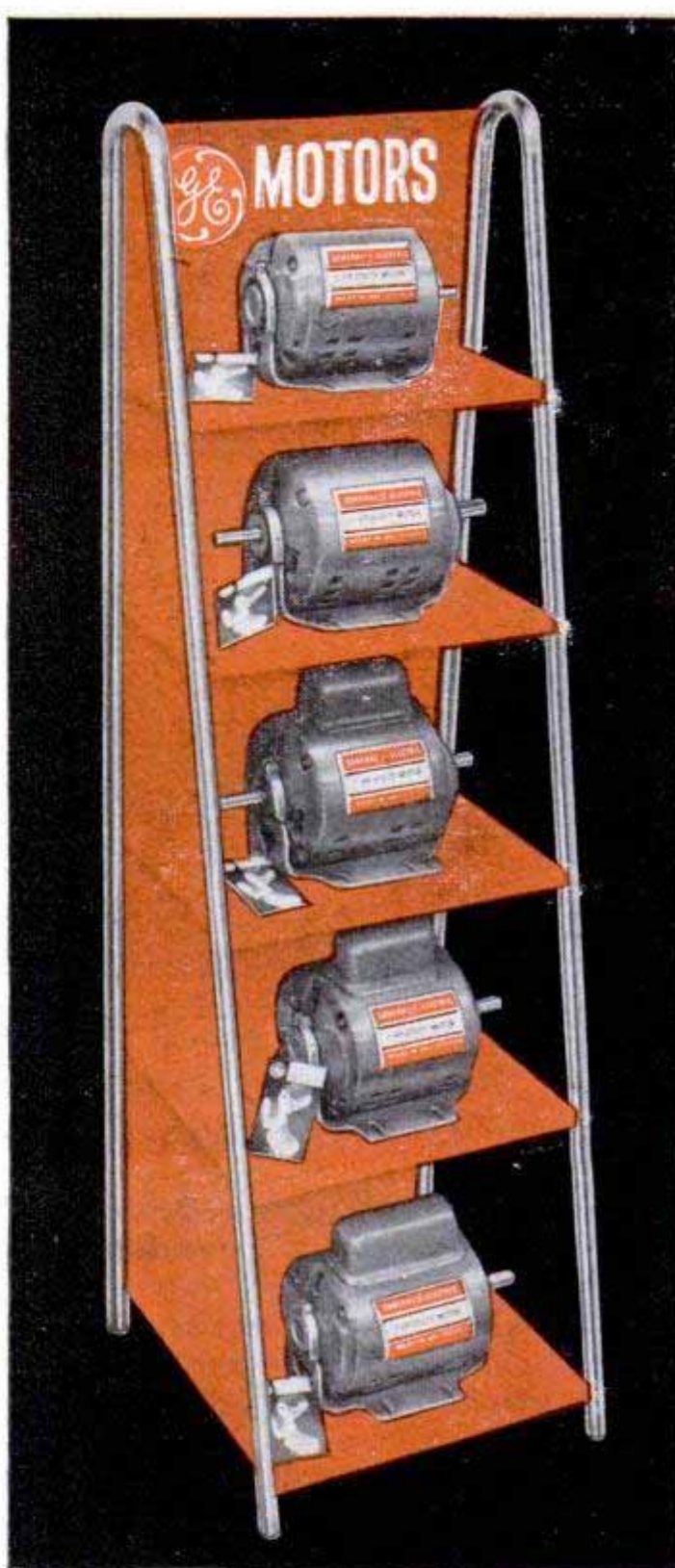
Studebaker's ventilating system is unconventional in that there are hinged vents on each side of the body controlled by hand levers. The heating and fresh-air system, which Studebaker calls the "Climatizer," is excellent. The heater is located under the right front seat.

The radio antenna is raised or lowered by the turning of a knurled knob mounted near the left foot of the driver. I like the two-speed electrically operated windshield wipers. The parking brake is operated by the right hand and its operation could be easier.

The vision is "out of this world" because of Studebaker's new styling and this applies to forward vision through the curved, one-piece windshield, as well as to the large wrap-around window in the rear. The new styling offers a sloping front hood for excellent vision directly in front of the car, which is definitely a safety feature. Undoubtedly, at high speeds, this low tapering hood contributes to better front-end stability, as wind pressure tends to push the front end downward. I'd prefer a counterbalanced hood instead of having to use a rod to hold it open.

Studebaker's Automatic Drive is dependable and positive. It combines an air-cooled torque converter with an automatic transmission. The low, intermediate and reverse ratios are used with the torque converter, which is bypassed in direct drive. The automatic shift is hydraulic and it goes into direct drive between speeds of 18 to 60 miles per hour, depending upon the throttle

(Continued to page 238)



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DEALERS: find out how you can get the all-new G-E Utility Motors and merchandising aids. Call your local G-E authorized distributor, or write Section 674-166, General Electric Co., Schenectady 5, N. Y.



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Now available through your local dealer—the completely new G-E Utility Motor gives you more for your motor dollar! Packed with more power per pound, it's smaller, lighter, easier to handle, mount and wire! You can use it with shaft up,

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opening. When the Studebaker Automatic Drive locks up there is no mushiness or slippage as the drive is positive and the torque converter ceases to operate.

The shift from various positions on the indicator is smooth and effortless. Low and reverse are side by side and this makes it easy for the driver to rock the car in snow or mud. Low range can be used for descending steep grades and to slow the car from fairly high speeds. There is noticeable roughness when moving the lever from neutral to low or reverse.

Most cars equipped with automatic transmissions have a tendency to "creep" when idling in low or drive range. Studebaker has licked this by incorporating in the transmission a device that eliminates creeping once the brake is applied while standing still. The foot can then be removed from the pedal and the car will remain stationary. Studebaker's time-proved "Hill-holder" is a great feature and too many people still do not know about this fine Studebaker exclusive feature. Once the brake is applied the foot can be removed from the pedal and the car will remain stationary on a hill. It will not roll backward one inch. This leaves the right foot free for throttle use. The unit is optional on Champion models and standard equipment on all others.

I think improvement could be made in the door closing and probably it was on subsequent cars (my test car was an early one). Four turns of the window crank are necessary to open or close the window. This ratio is an improvement over the previous models. I'd prefer the cranks turning in the opposite direction, as they do on other makes.

The seat springs and back cushions could stand more padding. Some buyers will complain of the lack of room inside the new Studebaker. On the other hand, there are others who are so thoroughly sold on Studebaker's new styling that they will sacrifice some inside room for styling and general appearance. The spare tire is mounted flat in the trunk, which doesn't have too much usable luggage space. (In the two and four-door-sedan models, the spare tire is upright and trunk space is excellent.)

While driving across country I talked with several Studebaker owners. I was surprised to find so many young enthusiasts raving about Studebaker's styling. Prior to the war, most Studebaker owners were a conservative group and preferred large and roomy cars to styling. Studebaker's 1953 styling has pleased the sports-car crowd. It is the first mass-produced car to

(Continued to page 240)

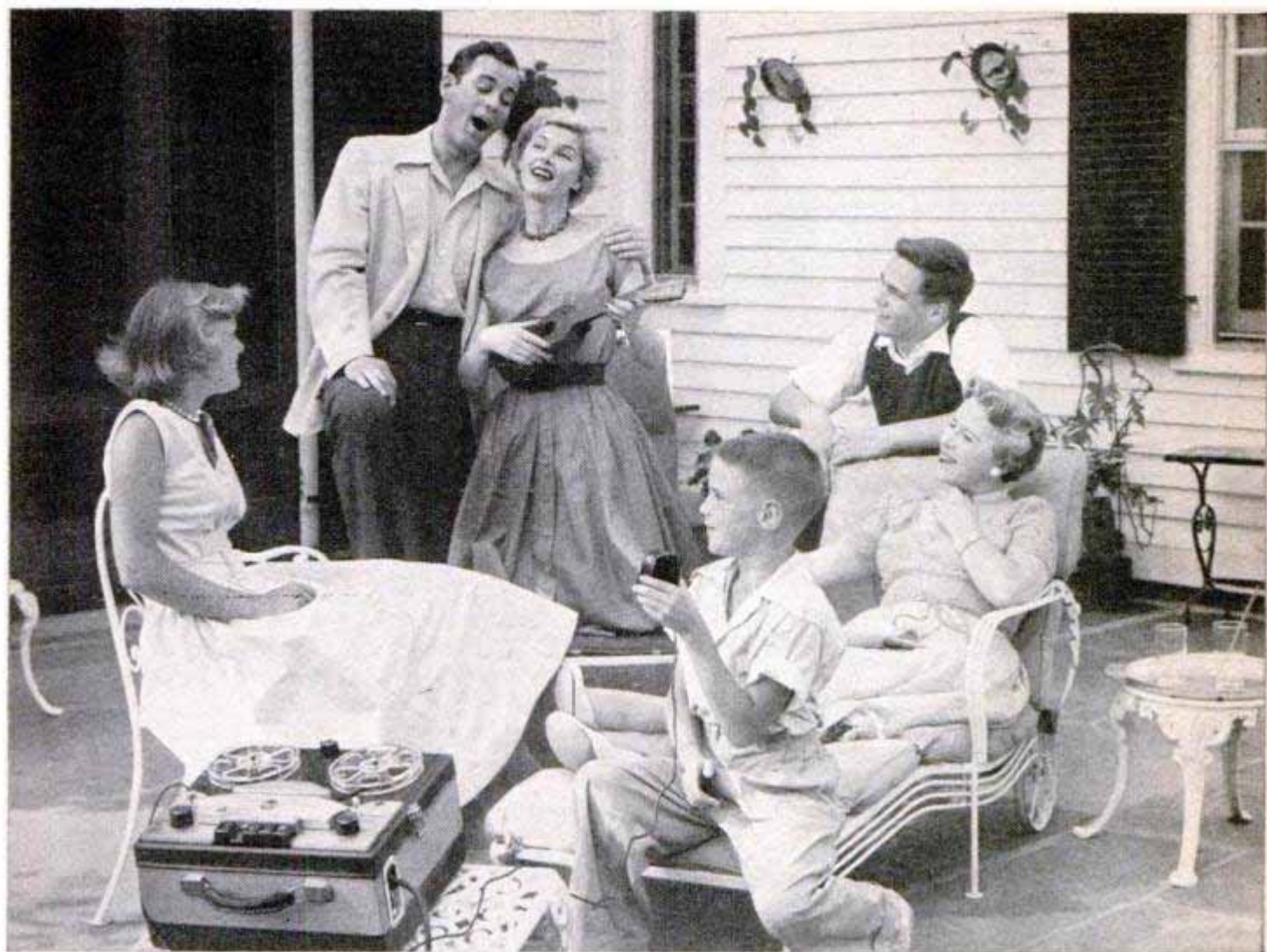


Costs less to BUY *Costs less to OWN* ...has get-up-and-go to spare

HERE'S mile after mile of thrilling sport as you zip through the country-side to outdoor pleasure spots and sports events. Even going to work is fun on this All-American lightweight. *Practical* . . . the 165 saves you time as it cuts through traffic tie-ups and parks in small spaces. *Economical* . . . it averages up to 80 miles per gallon. See your Harley-Davidson dealer today and ask about his club and easy-pay plans. Or, send 10¢ for ENTHUSIAST Magazine and illustrated literature. Harley-Davidson Motor Company, Dept. P, Milwaukee 1, Wis.

Harley-Davidson

WITH *Telo-Glide* FORK — 



You're funnier than Berle...better than Pinza!

Make your debut on the new RCA Push-Button Tape Recorder

A push of a button—and *you're on!*

The new RCA Tape Recorder proves it: yours is the greatest theatrical family of all time. Well, better than the Talbots next door, anyway.

There are years of entertainment and fun built into this electronic wonder—the finest portable tape recorder made. And it has its practical side, too.

You can tape your favorite radio programs and the sound portions of top TV shows. Your children can use the recorder to polish up on piano lessons—and there's no better

way for you to rehearse important business talks and speeches.

But mainly this versatile recorder will be the sound and voice of your family. Birthday parties, holiday gatherings, weddings—captured for a lifetime on tape!

The RCA emblem is your assurance of perfect tonal clarity, top operational ease, and many, many years of dependable wear.

Another great RCA achievement brings the very best in sound and entertainment into the home. *First the RCA Victor phonograph, then RCA Victor radio, and RCA Victor television. Today the new RCA Push-Button Tape Recorder. Many tomorrows are in the RCA "workshop," too!*

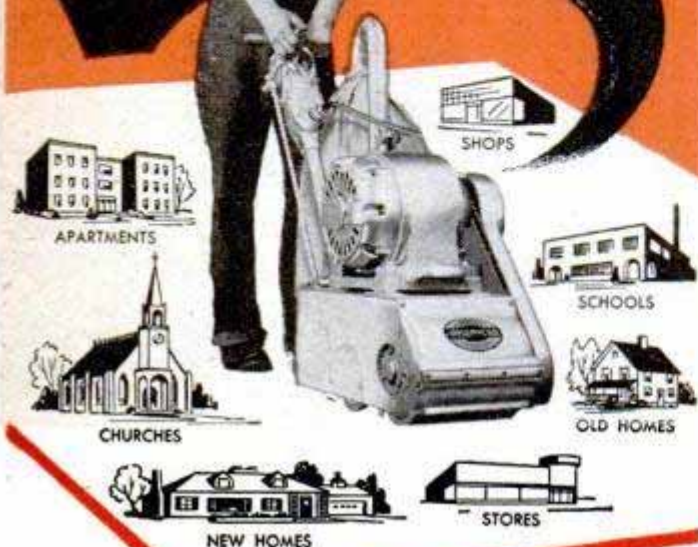


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The American Floor Surfacing Machine Co.
535 So. St. Clair St.
Toledo 3, Ohio

Enclosed find 25c in stamps or coin for booklet “Opportunities in Floor Surfacing”, telling me how I can start my own floor sanding business.

Name.....

Street.....

City.....State.....

have a sports-car look. While the dyed-in-the-wool sports-car driver will not consider Studebaker a sports car in the competition sense, most of them believe the styling is a step forward. The more conservative buyer will like the sedan models best as they are higher and have more interior room, yet even they have somewhat of a “sports car” look. Studebaker buyers for 1953 have a choice of the six-cylinder Champion and the V8 Commander and Land Cruiser models with either sedan or coupe body styles. The 85-horsepower Champion models, having less power and top speed, are the real stingy cars of the line so far as gasoline economy is concerned. Its 169.6-cubic-inch six-cylinder engine has a great economy reputation.

Not since the days of the Mercer Race-about, the Stutz Bearcat, the supercharged Auburn, Cord and Duesenberg has a manufacturer catered to demands for unique styling as the South Bend independent has done. Certainly Studebaker offers the most unusual American car produced in years. It will be a long time before an American manufacturer brings out a more controversial automobile! ★ ★ ★

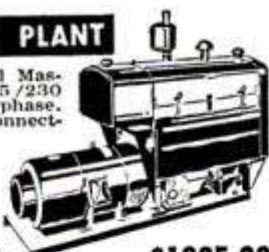
Vibration Detector Locates Wall Studs



Two steel balls, hermetically sealed in a transparent plastic tube, locate hidden wall studs by measuring the movement of the wall when it is tapped with the fist. The shock of the slight blow is transmitted to the device and sets the balls in motion. The balls move the least when the movement of the wall is least, a point directly over a supporting member.

DIESEL LIGHT PLANT

(Item 1660) Diesel Master—11-12 kw. 115/230 v. AC single or 3 phase. 1800 rpm direct connected. Electric Self-starting. Engineered for permanent power where continuous low-cost, heavy duty service is important. Wt. 1350 lb. Reg. list \$3650.00.



\$1895.00

10-11 kw. GAS DRIVEN PLANT. 115-230 v. 60 cye. AC, single or 3 phase, powered by 4 cylinder Wisconsin air cooled engine. Belt driven. With self-starter. Constructed similarly to Hi-Line 6 KW shown below but much larger. (Item 217) Wt. 900 lb. Factory price.....

\$1145.00

PORTABLE LIGHT PLANTS

350 Watt Plant (Item 273) 115 v. DC. 1 1/2 hp. Briggs Engine. Perfect for lights, radios and small power tools, etc. Wt. 65 lb. Factory price.....

\$99.75

PUSH BUTTON START
AC Plant 600-700 Watts—115 v. 60 cye. Powered by a rugged 2 hp. easy-starting Briggs gas engine. No wiring necessary. Just plug in and operate. Plenty of current for any oil burner, freezer, brooder, emergency lights, etc. which require up to 700 w. Ideal for Civil Defense, Fire Depts., trailers and camps. Complete with voltmeter and built-in winding to charge 6 v. battery. Item 24. Wt. 75 lbs. Be prepared if war or storms knock out power lines. Reg. \$275.00 value.....

(Item 24)

1000-1200 Watt Plant (Item 45) same as Item 24 but with larger generator and engine—50% greater output.....

\$199.50

1500-1700 Watt Plant (Item 20)—Similar to Item 24, but has three times more capacity. Wt. 173 lb. Factory price.....

\$279.50

MASTER-LITE 2500 Watt PLANT

110/120 v. 60 cye. AC. A powerful plant, ruggedly constructed and yet designed for easy portability. Can be started by rope or built-in 12 v. electric push button starter. Built-in winding to charge battery. Powered by a big 5.10 Briggs engine, complete with all accessories. Includes control box, voltmeter and handy plug-in power receptacle. Ideal for permanent or stand-by service. Wt. 225 lb. Reg. \$329.50. Factory price.....

\$329.50

3500 Watt Plant Push Button Start (Item 23) 115 v. 60 cye. AC. Similar to above, but larger and 33% more capacity. Wt. 270 lbs. Reg. \$760. Factory price.....

\$379.50

GIANT 2000-2500 Watt Plant—110/120 v. AC, belt driven so that engine may easily be utilized for other purposes. Powered by a rope start, 6 HP engine. Wt. 210 lb. Regular list price \$585.00. Factory price (Item 31).....

\$299.50

Generator only and control box (Item 31a) \$169.50

HI-LINE 6000 WATT PLANT

(Item 102) Push Button Start. 115-230 v. 60 cycle AC. A brute of a power plant with a rugged 14 hp. Wisconsin engine. Plenty of electricity for ranges, water heaters, freezers, pumps, machinery, etc. Affords both 110 and 220 volts. Ideal where heavy current is needed. Wt. 590 lbs. Easily worth \$995.00. With self starter. Factory Spec.

\$645.00

Same plant with Crank Start (Item 166). Generator and control box only, belt driven. Use your own engine or tractor. Wt. 240 lbs. (Item 163) Factory price.....

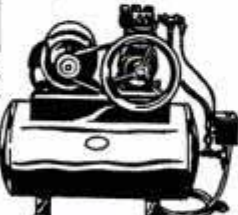
\$345.00

We make fully automatic controls to operate any of above light plants. Write for details. We make all sizes up to 25,000 Watts—Write.

MASTER SHOP COMPRESSOR

Big and rugged. This stationary compressor provides 8 c.f.m. plenty of air for industrial uses, powerfully heavy duty repulsion induction 3/4 HP, 115/230 v. motor. Factory type twin cylinder compressor designed for continuous operation. Mounted on heavy 20 gal. steel tank. Complete with unloader type automatic switch, pressure relief valve, check valve, gauge, shut-off valve, and 20 ft. heavy duty air hose. (Item 209h) Regular retail \$319.50. Factory price.....

\$179.95



BUY FACTORY DIRECT—SAVE

NEW MOTOR BIKE



Our Commando Motor Bike is trouble-free—carries amazing 5 yr. guarantee. Goes up to 150 miles per gal. on all roads. Speed to 40 mph. No oil or gas fumes. Easy automatic pedal or pull starting. Has new principle of automatic transmission. No belts or chains—power transmitted directly to rear wheel. Accelerates quickly. Complete motor and kit ready to attach to your bike in one hour. Get FREE folder. Factory Price.....

\$125.00

Complete motor and Chassis.....

\$199.50

1 1/2 TON MASTER HANDEE DUMP

Here at last is an all-purpose 1 1/2 ton dump trailer. Can be used anywhere, inside or out for hauling sand, gravel, dirt, coal, grain, trash, industrial scrap, etc. Unloads, tilts, dumps to either side with one pull of the handle—yet trailer cannot tip. Ruggedly built, girder type frame equipped with pneumatic 4:00x12x6 ply tires and Timken roller bearings. Easily towed by any car, truck, jeep, tractor, etc.—has universal ball hitch front and rear—several "Handee-Dumps" are instantly coupled together. Capacity 1 1/2 ton—34 yd., overall length 104", width 40", wheel base 84". (Item 237) Wt. 460 lb. Factory Special.....

\$350.00

DUAL TIRE (8 wheel) model, similar to above, 510 lb.....

\$450.00

SAVE \$15—BUY of the MONTH

FLEXIBLE SHAFT

A precision built, heavy duty tool with amazing flexibility. Replaces a dozen individual tools—drills, buffs, grinds, sands, saws—handles jobs in impossible places. Fits any 1/2" shaft on lathe, drill press, grinder motor, spare gas or electric motors, etc. Heavy duty 5/8" piano wire core encased in tough rubber housing. Handle and arbor equipped with precision ball bearings, rugged industrial type for years of service. Arbor takes all 1/2" bore wire wheels, grindstone, etc. 1/2"-20 standard threads. Operates on any 1/4, 1/2 or 1/2 hp. motor.

(Item 240) Wt. 10 lb. Reg. \$20.95.....

\$15.95

HEATING & VENTILATING FAN

(Item 10) Easily installed in furnace pipes. Forces even heat to all rooms. Over range removes kitchen smoke and odors. Powerful, continuous duty motor. 110-120v. AC. Mount in wall or ceiling to ventilate any area. Quiet, super-efficient fan moves huge volume of air. (400 to 600 CFM); 8" Fan, wt. 5 lbs. \$6.85; 9" Fan, wt. 6 lbs. \$7.85; 10" Fan, wt. 7 lbs. \$8.85; 12" Fan, wt. 8 lbs. \$9.85. HEAVY DUTY FAN. Semi-enclosed motor, suitable for spray booths, restaurant exhausts, poultry houses, etc. 10" Fan, wt. 8 lbs. (Item 10E).....

\$11.95

12" Fan, wt. 10 lbs. (Item 10D).....

\$12.95

JET FLOW BLOWER

Tremendous air movement (1700 CFM) and quiet operation make this double inlet 10" turbine blower unbeatable for heating, cooling, drying and air conditioning. Ideal for attic or barn ventilation, converting gravity heating to forced air; spray booth exhausts, etc. Operates with any 1/4, 1/2 or 1/2 HP motor. Oversized, long life bearings. Includes variable speed motor pulley and belt. Dimensions 19" hi x 8" x 16 1/2". Outlet opening 13 x 11 3/4". Wt. 45 lbs. Item 245. Reg. \$54.50. Factory Special.....

\$27.50

HEAVY DUTY 1/2 HP motor for above \$16.95

MASTER AIR COMPRESSOR

(Item 209) High pressure type for large volume of air for heavy duty service. For paint spraying, inflating truck and auto tires, greasing and the hundreds of other jobs done by compressed air. Piston type, 2" bore compressor with built-in air filter. Master built with high strength alloys and precision bearings. Stainless steel tank 12"x24" 2100 cu. in. cap. Safe up to 500 lb. Equipped with automatic switch that starts and stops motor to maintain desired pressure (up to 150 lb.) and check valve, safety valve, gauge, shut-off valve, 20 ft. air hose and tire chuck. Beautifully balanced on ball bearing wheels and rubber tires. Low factory prices. With 1/2 hp., 110 v. A.C. motor. (Reg. \$175.00) (Item 209p).....

\$109.50

With 1/2 hp. motor. Reg. \$129.50

\$129.50

With 2 hp. Briggs Gas Engine. Reg. \$199.50 (Item 209B).....

\$119.50



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SELF-PROPELLED

It's a snow-blower It's a rotary mower
It's a power sickle It's a rotary tiller
It's a cultivator It's a plow

Where can you get a power tool that does so many jobs? Works for you the year 'round. Does terrific job of cleaning snow from walks, drives, etc. without backbreaking work. Also prepares deep mellowed seed beds, cuts weeds, lawns, etc. The Master Gardener—does more than tractors costing twice as much. Converts in minutes to Tiller, Power Sickle, etc. Basic self-propelled 2 hp tractor, Briggs or Clinton engine.....

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\$15.75

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Lawn Mower Hitch.....

\$4.50

Freight prepaid to most areas. Easy payment plan available.

37 Pc. SOCKET SET

Highest quality, guaranteed, non-breakable sockets made by Husky. Beautifully matched chrome alloy, absolutely the best. Complete range of 17 sockets from 1/4" thru 1 1/2" (1/4" drive) and 7/16" thru 1 1/2" (1/2" drive), 1 extension, reversible 1/4" ratchet, adapter bit, sliding "T" handle, "L" handle, 1/2" speeder, 5 pc. alloy end wrench set, 8 pc. Allen wrench set, and a big doghouse tool box. We challenge anyone to match this value. Easily worth \$41.95. Wt. 14 lb. (Item 50).....

\$16.95

44 Pc. SOCKET SET

(Item 59) Same unconditionally guaranteed, non-breakable sockets above—but with added sizes. Complete range of 21 sockets from 1/4" thru 7/16" (1/4" drive) and 7/16" thru 1 1/2" (1/2" drive). Two extensions, reversible 1/4" ratchet, "L" handle, sliding "T" head, all angle coupling, 1/2" speeder, 1/4" breakerover, 5 pc. high chrome alloy combination wrench set and 8 pc. offset wrench set in big doghouse tool box with ample room for other tools. Reg. \$49.50. Wt. 16 lb. (Item 59).....

\$21.95

52 Pc. SOCKET SET

(Item 205) Contains a complete set of sockets in 1/2" drive, 3/4" drive and 1 1/2" drive, plus all necessary extensions, handles, speeders, reversible ratchets, etc.; all unbreakable, guaranteed against breakage. Beautifully matched chrome steel tool box. Wt. 17 lbs. List Price \$62.90. Factory Special.....

\$27.95

EXTENSION CORD

Heavy duty, made of Buna insulated #14, 2 conductor stranded wire encased in a treated braided jacket moderately flexible and ideal where frequent coiling is not required. Resists oil, grease or water. Use indoors or out. Complete with heavy rubber plug and out-let. (Item 16) 40 ft. 2 1/2 lbs.

\$1.99

Combination 2-40 ft. and 1-20 ft. (total 100 ft.).....

\$4.95

100 ft. length (1 piece).....

\$4.85

NEOPRENE EXTENSION CORD

#16, 2 conductor stranded wire, extremely flexible. Ideal for hedge trimmers, lawn mowers, power tools, etc. Tough and rugged, withstands any abuse. Complete with rubber plug and outlet. 40 ft. (Item 17a) Wt. 2 1/2 lbs. Regularly \$4.95. SPECIAL.....

\$2.45

Combination 2-40 ft. and 1-20 ft. (total 100 ft. (Item 17b).....

\$5.95

100 ft. length (1 piece).....

\$5.85

Wire only. No fittings. 100 ft. (Item 17r).....

\$5.00

NEOPRENE CABLE #14-2 (Item 185)

Heavy duty, very flexible, 20 year quality. Wt. 9 lbs. 100 ft. Complete with rubber plug and outlet. A terrific buy at only.....

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NO. 12-2 POWER CABLE

Very flexible rubber covered, special outside shield for grounding power tools, etc. 50 ft. (Item 199) Wt. 8 lbs. \$6.95. 100 ft. (Item 200).....

\$12.95

HEAVY DUTY D-C ARC WELDER

Use as portable or shop welder. Up to 300 amps. Senior model. Made for years of trouble-free, continuous service. Will handle light or heavy jobs. Easily welds up to 3/4" plate using 1/4" rods. Built-in air cooling system. Arc is easy to strike and hold, because of specially designed arc stabilizer. Hi-lo switch and dial control gives wide range of welding heats. Run welder at 2000 rpm. with tractor, jeep or 15 hp. gas engine, or 7 hp. elec. motor. Complete with instructions, guar. and triple V belt or flat pulley. You can pay more, but you can't buy a better welder. Wt. 110 lbs. \$400 value at.....

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DUAL CONTROL MODEL same as above but with built-in dual rheostat for low heat.....

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WELDING KIT. Two 10 ft. leads, welder helmet, electrode holder, ground clamp. Sold only with welder at.....

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MASTER MECHANIC MFG. CO., DEPT. 150 Burlington, Wis.

Bringing Back the Red Salmon

(Continued from page 85)

often means encounters with bears. The biologists carry guns.

Counting fish on Salmon Creek one day, Dick Shuman stood with meter in hand. His eyes were only on the water—until he heard the scream of another biologist.

Wheeling, he saw a great brown, nature-fitted overcoat coming at him. He grabbed his rifle which had been cradled beside a log, then stumbled. The bear hurtled on top of him, and at the same instant the rifle fired. Shuman doesn't remember ever pulling the trigger, but the bear's left ear got the full effect of the blast.

Roaring with startled rage, the bear plunged into the creek and plowed crazily up the fast waters for a hundred feet. Then, apparently coming to its senses, the bear took off up the opposite bank. Shuman began counting fish again.

"As many as 16 bears have been sighted on a stream at one time," says Project Leader Nelson. "The area has apparently been the haunt of the bears for centuries. Some of their main trails between streams have been worn 18 inches deep."

But the bears actually don't worry the biologists as much as shortages of food and tobacco supplies when a plane can't make

a landing. Running out of tobacco, the biologists have smoked tea leaves, coffee and dried grass.

Any day in the week, Dolly Varden trout—up to two feet long—can be yanked out of a near-by stream. But, when a man has been working with fish most of the day his appetite for them fades.

During each day of the juvenile-salmon migration, a sample of at least 50 fish is taken for weight, length and age determination. Each is anesthetized by dipping it into a pan of water containing one-half of 1 percent urethane. Then it is measured, weighed and scale samples taken. Placed in a tub of fresh water, the young salmon is ready to take off again shortly.

The chore that plagues above all others is counting fish through the weirs placed across stream outlets from the lake . . . the young salmon venturing out to sea . . . the adult salmon returning to die. The counter sits and sits, wonders how the Yankees are making out, counts and counts, wonders how his bowling team in Seattle is faring without him, sits and sits.

And just how is this strange assignment in a strange spot paying off?

Scientists—both in and out of the U.S. Fish and Wildlife Service—are conservative men. But the biologists working on the

(Continued to page 244)

It's easy to make these **REPAIRS**

You can make loose metal, wood, or plastic parts tight; anchor bolts in concrete to stay; seal cracks in metal; tighten loose screws and fixtures in wood, metal or tile—with Smooth-On No. 1, the iron cement of many uses. Just mix, and fix. Smooth-On No. 1 hardens quickly like iron, and expands as it sets. Forced into any opening, its unique expanding action makes the repair. Keep a can on hand, it will not deteriorate. Smooth-On No. 1 is at your hardware store.

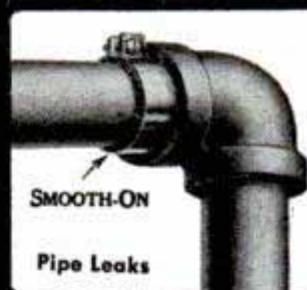
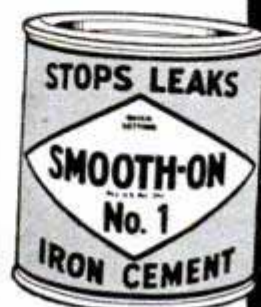
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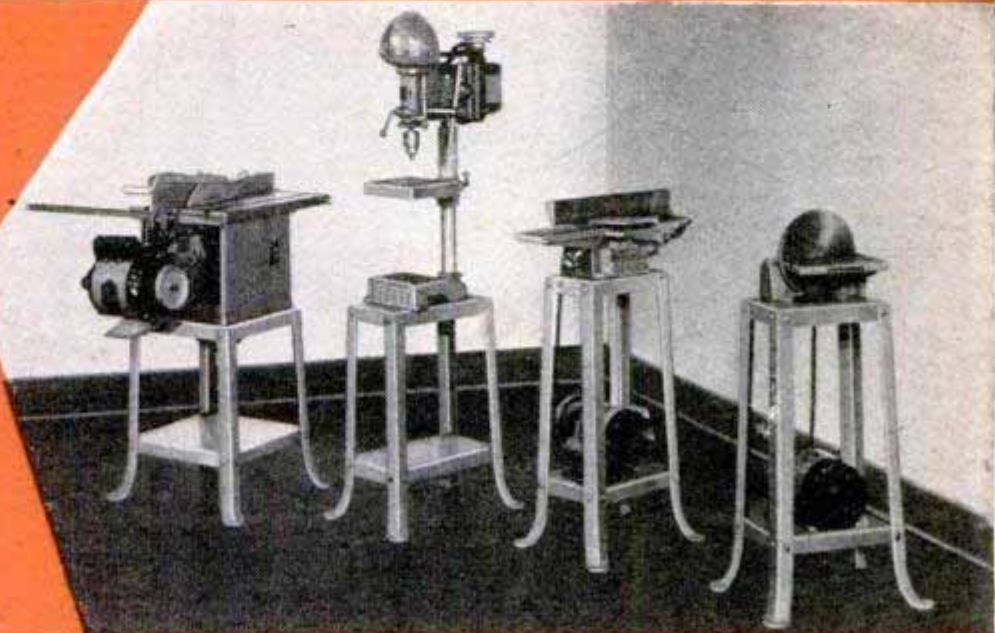
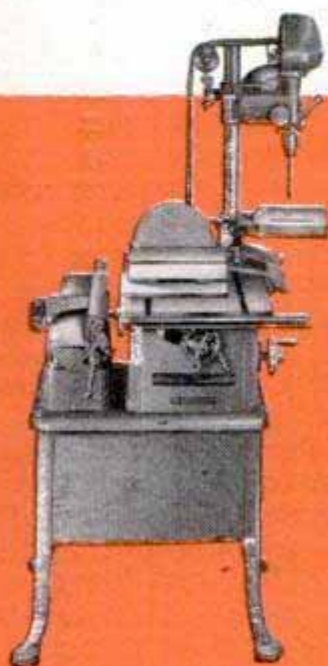
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Many long-awaited features distinguish this revolutionary new 3-foot square, one-motor combination tool that does 95% of home repair and improvement jobs. For example:

the *Only* combination of individual "MUST" tools Basic Delta tools, ready to do the work they are designed for—in the normal sequence of operations—without wasting time on set-ups and adjustments.

the *Only* combination tool built around a tilting arbor circular saw The most-used tool is your saw—on the DELTASHOP, it's a rugged machine—and, the blade tilts, not the table.

the *Only* combination tool with a true jointer As soon as you saw a board, you need a jointer—the only fast, easy way to get a true edge. Circular saw and jointer are a natural team.

the *Only* combination tool you can change to individual tools As your shop expands, you may want individual tools. Only your DELTASHOP makes it possible—no loss of your original investment.

the *Only* combination tool you can assemble "a tool at a time" Get these basic tools one at a time and combine them later into a one-motor unit.

the *Only* combination tool that gives so much for so little This unbeatable unit can be yours for ONLY \$229.50*—complete with steel stand. Your Delta dealers' easy payment plan makes it a pleasant and painless purchase.

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If bought separately, each tool complete (motor with attachment) costs:

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Using one interchangeable motor, the trio costs 104.25

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Manufacturers of SPEEDMATIC and GUILD Electric Tools

salmon project have that pleased look when they tell you:

Fertilization has increased several fold the number of photosynthetic plankton in the water. This has meant more food for larger plankton. As a result, they have increased both in numbers and in their reproductive capacity (more eggs per female.) Since the larger plankton represent part of the diet of the young red salmon, how have the fish responded to the increase in food? Again, measurements taken on migrating fish show both an increase in the length of the fish and a 20 percent increase in their weight.

Bare Lake is no longer on the way to becoming barren. All indications now point to the fact that the productivity of the lake has been increased. And what is good for Bare Lake should be good for Karluk Lake —and many others.

The missing link in the chain of salmon from lake to river to sea and back to lake again may be just a sack of fertilizer. The real test will be the counts of salmon caught in the years to come. But with bigger and better fish already produced on the improved lake diet, the increase in numbers should come.

Meanwhile, the scientists continue to plug away at their checks and rechecks of fertilized Bare Lake—and wish that the U.S. Fish and Wildlife Service would appoint a woman to drop in and check on them. Only a woman could fully appreciate the thousands of gorgeous baby orchids which grow wild on the otherwise grim hills beside Bare Lake. ★ ★ ★

Paint-Roller Attachment



Exterior painting is speeded with a roller that clamps to any 3, 3½ or 4-inch brush. Excess paint normally wiped off the brush is applied and spread with the roller. The result is said to be a smooth, even coating of paint. The brush is used to paint the edges of clapboards and shingles, or can be used lightly to follow through with the roller.

NOW OUR HOUSE LOOKS BRIGHT AND NEW

Thanks to GOLD BOND Asbestos Sidewall Shingles



"What do you do when your house needs painting so badly that even the neighbors are talking about it? Dip into your savings account and go ahead with the job anyway? It seemed the only answer for me."



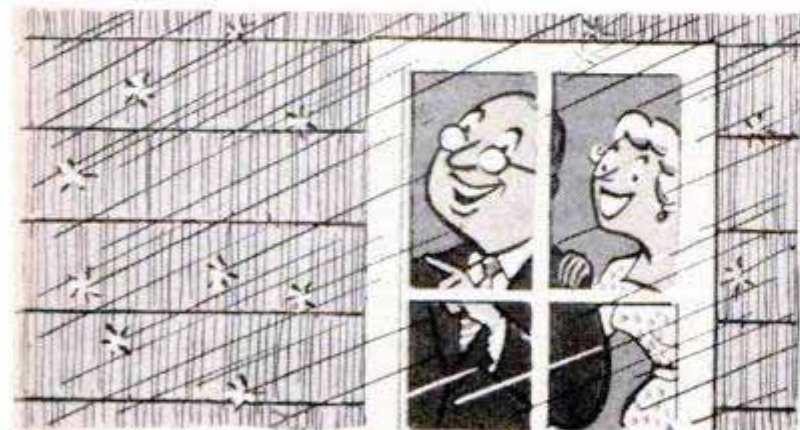
"My friend Joe's house always looked spic and span—like a new coat of paint. 'Paint nothing!' he told me. 'Those are GOLD BOND Chroma-Tex Asbestos Shingles with new color-protecting Surfaseal Finish.'"



"I went to see my GOLD BOND dealer. He showed me that Chroma-Tex shingles are fireproof...and proof against rot, rodents and termites too. Made of asbestos-cement... they never wear out, never need paint to preserve them!"



"The low cost of having our house sided surprised me. The new shingles went right over our old clapboards. We had a choice of 5 colors and picked one that pleased the whole family!"



"We have the best-looking house in the block now. And, it's a real satisfaction to know that it will stay that way...no more repainting worries for us." See the new GOLD BOND Asbestos Siding Shingles at your Gold Bond dealer's today!

You'll build or
remodel better with
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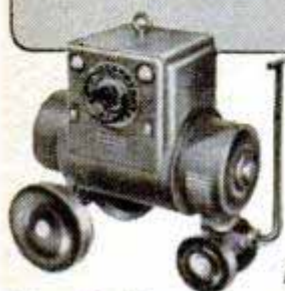
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Don't Try to Beat the Customs!

(Continued from page 70)

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the time seems ripe to smuggle, say, \$250,-
000 worth of diamonds into this country,
four or five apparently respectable busi-
nessmen put up perhaps \$40,000 or \$50,000



"Stop! You're tickling!" Indian crew member giggles
as port-patrol officer conducts a personal search

apiece. This pays the cost of assembling
the gems and the almost negligible cost of
smuggling them in. If the attempt is suc-
cessful, these men will realize a profit of five
to ten percent within a few days.

Usually they choose a complete stranger
as the carrier. The carrier may be someone
from this country who is broke and strand-
ed in Europe, or perhaps a European who
wants to visit relatives here. After a care-
ful study of the victim's situation, a hiring
of the "syndicate" approaches the stranger,
offering a plane ticket and a ridiculously
low fee for bringing in the stuff.

Not long ago customs was tipped off that
a shipment of gems was on its way in by
air, so agents were on hand to meet a cer-
tain Royal Dutch Airlines plane. After ex-
amining each passenger they seized a 26-
year-old immigrant woman from Belgium.

(Continued to page 248)

BUSINESS OPPORTUNITY

IN AUTOMOTIVE ELECTRICAL SERVICE

*Auto-Lite franchise offers you up to \$100,000
added high-profit volume*

More than half of the makes of cars now on the road are factory-equipped with the nationally famous Auto-Lite line of electrical equipment! Here's what a franchise with this 42-year-old company can mean to you: a complete line of the best-known automotive electrical parts with a huge ready-made market for a profitable business, backed by a powerful consumer advertising campaign (radio, TV, magazines) that makes EVERY DRIVER A POTENTIAL CUSTOMER; a giant selection of dealer helps, display signs and service manuals; and above all

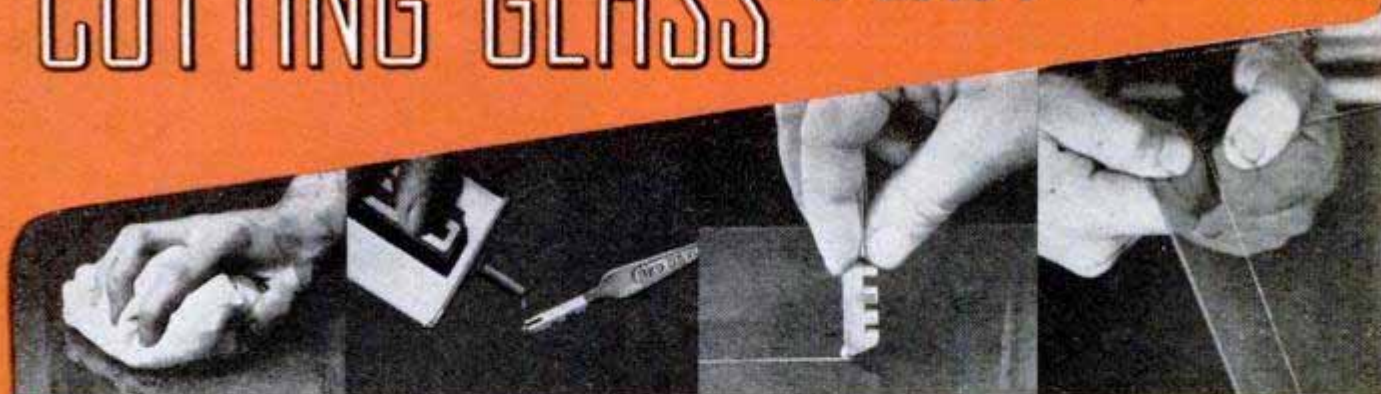
—REAL SECURITY. (Actual company records show less than 2% mortality per year from all causes in the past 20 years.)

Don't let this rare opportunity escape you. If you are financially dependable and are interested in receiving full information regarding this profitable opportunity—write now. You may qualify for one of the openings available in your territory!

THE ELECTRIC AUTO-LITE COMPANY

Parts and Service Division
Toledo, Ohio

CUTTING GLASS is EASY



Wipe glass clean with clean rag. Get rid of all dirt or film which prevents the glass cutter from making a uniform cut.

Lubricate the wheel of your Red Devil glass cutter using any household oil. This supplies oil to cutter wheel and reduces friction between glass and edge of wheel.

Always make an even, continuous stroke across the whole surface and off the edge of the glass. Never cut twice. Practice cutting scrap glass, first.

To break glass, hold firmly on opposite sides of cut line. Give quick bending motion away from cut, keep fingers close to cut. Break right after cutting so cut does not get "cold."

EASY as this, if you have the right tools
and know how to use 'em.

your . . .

Red Devil

Hardware or Paint Dealer can take care of both these needs. Get full details by getting your free copy of Red Devil's booklet "How To Cut Glass" from your dealer or mail coupon today! Remember—you want Red Devil Tools—

the kind
professionals use.



Red Devil Tools.

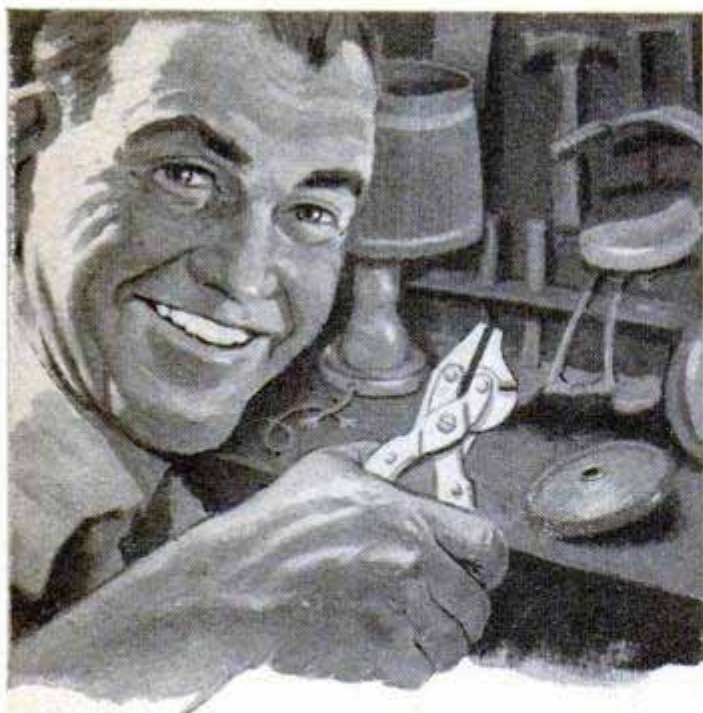
Box 502
Irvington 11, N. J.

Please send me "How To Cut Glass"

Name _____

Address _____

City _____ State _____ 3035



You're *Mr. Fixit* himself . . .
with a **GRIP-SNIP** in your hand!

When something needs fixin' around the house . . . just grab your GRIP-SNIP* and *fixit!*

Your GRIP-SNIP will do 5 kinds of jobs easily and well.

1. **Grips like a vise** . . . Doesn't slip. Doubles your strength.
2. **Cuts wire easily** . . . even when it tightly hugs a flat surface.
3. **Holds nuts like a wrench** . . . powerful parallel jaws, extra leverage.
4. **Gets into tight spots** . . . jaws have small nose.
5. **Unkinks wire** . . . Open throat permits wire pulling and many operations that are impossible with other types of pliers.

Remember, you can't be a top-flight MR. FIXIT without a GRIP-SNIP. So get one today at your local hardware dealer. The cost is small . . . and you can get a GRIP-SNIP in 4½", 5½", 6½" and 8" lengths. For descriptive literature, write us, Dept. 20J.



*Trademark

Sargent & Company
New York • NEW HAVEN, CONN. • Chicago
Builders Hardware and Fine Tools since 1864

When they pried off the soles and heels of her "wedgie" shoes a glittering river of diamonds poured out—1674 carats of high-quality gems, cut, polished and ready for a market that would yield almost \$250,000.

The woman pleaded not guilty and was held pending action by the grand jury.

Somewhat later the agents made a routine search of her baggage. From the hollowed-out wooden supports of the suitcase tumbled another cache of 1500 carats of diamonds valued at \$200,000. It was the biggest gem seizure in custom's history.

The woman later confessed, and revealed that a stranger in Europe offered a plane ticket and \$100 to make the trip. She was



Woman "runner" wearing two of these jewelry-covered shirts tried to smuggle the stuff from Mexico

upset because she had received only \$80 of the promised fee. She had been clipped \$20 to deliver almost a half-million dollars worth of gems!

On occasion, the agents are puzzled by a smuggler's tricks even after a seizure. A short time ago customs was tipped off that a European, then in Canada, was about to smuggle a packet of diamonds into the country. (Anyone who tips off agents to a successful seizure, with a resulting conviction, receives one-fourth of the selling price of the contraband when it is auctioned, up to a maximum of \$50,000. This makes it well worth-while to tip off customs to a scheme running into thousands of dollars.)

The suspect, followed in Montreal, was
(Continued to page 250)

General Salvage Co. SURPLUS Bargain-SALE! BUY DIRECT FROM THIS AD

BUILD YOUR OWN ARC WELDER OR LIGHT PLANT



Save \$750 to \$500
D-C GENERATOR
\$15.50 used, good cond.
Instr. incl. for Comb. weld-
er & light plant. 200 amps. 28
Volts. 2500 to 4500 R.P.M. Or
Brand New.....Price \$21.50
PRICE F.O.B. K.C. MO.

CONVERTS TO ARC WELDER 200-250 AMP.
OR LIGHT PLANT CAP. LOAD 5000 WATTS

Stock No. 711 D.C. Generator R-1 Jack &
Heintz, rated 300 Amp. 30 Volts. Gov't. cost
\$300.00. Instruction for converting
to welder or light plant incl. **\$25.50**

RHEOSTAT #R-27 heavy duty recommended
for regulating the voltage on **\$6.95** post-
the converted electric welder.

Carbon Pile GENERATOR VOLTAGE REGULATOR
For use with 24 or 32 Volt D.C. Generators.
Also recommended for the P-1 and R-1 type
generators in "build your own"
Light Plant. Only, postpaid. **\$6.95**

New Ampidyne MOTOR GENERATOR. Use as
24/32 D.C. motor, pulls 1/2 HP. Applicable for
110 V. A.C. by simple change in
connection. Applicable to inde-
pendent and rural lighting. In-
structions incl. Wt. 30 **\$7.50**
lbs. Cost over \$140.00.

D. C. GENERATOR. Brand new.
Navy Type for Farm-Home-Itanch.
Delivers 430 Volts D.C. at 3450
R.P.M. Ball bearing supported. Fan
cooled armature. Self lubricating
bearing. #211220-A. Wt. **\$7.50**
21-lbs. Now only.....

ROMEC WOBBLER PUMP. Hand lever operated.
Ideal for Camp, Farm, Ranch, for fuel transfer
to boats, etc. Self priming, including built in
relief valve. Capacity over 160 G.P.H. **\$8.95**
\$60.00 value.....

WEAVER HYDRAULIC HAND PUMP New
With Built in Check & re-
lief valve. For oil or Hydraulic
Fluid. Rated 2000 P.S.I. **\$9.95**
data incl. \$75.00 Value.....

**VALUABLE GEARS BARGAIN SPEED RE-
DUCER.** 5:1 or 10:1 ratio 90 degree angle 1/2"
splined shaft with 3 mount- (Add 50c
inc. holes rated 2 H.P. **\$5.95** Postage)

SOLENOID #804 Equipped with lever
arm which gives a 1/2" or 1 1/4" travel.
Compact, powerful as actuator & to op-
erate locks, switches, etc. Applications
etc. For 24V. D.C. & applicable for
110V. A.C. Instructions included.
Ea. **\$2.95** Pair **\$4.95** post-
paid

Hydraulic Solenoid Control Valve
BENDIX. No. 81560. For remote con-
trol operation and to operate one single
action or double action hydraulic cylin-
ders with 24 V. D.C. 800 to 1500
P.S.I. connections are .550"-18thd. Appli-
cable for 115 V. A.C. Instructions & Data
included. **\$3.95** ea. **\$7.50** per
pair \$35.00 value.....

RIGHT ANGLE DRIVE with 1 to 1 ra-
tio through 90 degree bevel gears. Drive
and take off shaft are 3/4" dia. Self
lubricating. Size 3 1/2"x2 1/2"x1 1/2".
Rated 1/2 H.P. at 1750 R.P.M. Ideal for
use with power tools, etc. Has three
3/16" mntg. holes on 1-5/16" **\$3.50** post-
center. Price.....

ELECTRIC ACTUATOR Has a
1/2 H.P. 24V. D.C. 7500
R.P.M. reversible motor with
integral push pull actuator.
Motor drives actuator in a
10" travel through a high
reduction gear box. Ideal for remote control,
two way action, for use in opening or closing,
lifting or lowering. Unit is complete with ad-
justable micro switches. The stationary load
rating is 2800 lbs. Overall
length 19". Stock #AA-1M **\$12.95**

VOLTMETER, DC. The Basic Ele-
ment of this meter is 30 volts DC
Voltmeter with zero center. Internal
resistance is 300 Ohms. Dial may
be easily calibrated to read DC Volts.
Brand New. **\$3.95** post-
paid \$25.00 value.....

FIRE EXTINGUISHERS 1 Quart size,
brass finish. Most popular utility fire
extinguisher. Ideal for emergency use,
light weight, handy size. Has double
pumping action. Used, tested operating
condition. Wt. approx. **\$3.95**
4 lbs. #700FL. Only..... (add postage)

CUNO OIL FILTER—Brand New
Aircraft type. Filters oil without
cartridge replacements. Just turn
handle and cartridge is clean.
Standard 3/4" inlet and outlet ports
to accommodate 14 gallons per
minute. STOP CHANGING OIL.
Instructions **\$4.95** post-
incl.

Send CHECK OR M. ORDER. PRICES F.O.B. KCMO EXCEPT when marked POSTPAID U.S.A.

ELECTRIC MOTORS
GEAR HEAD MOTOR Heavy duty 1/4 H.P.
3400 R.P.M. Series wound, Reversible,
including built in reduction gear with 14:1 ra-
tio Gear shafts runs 600 R.P.M. For 24VDC
& applicable for 110VAC. Ideal for rotating
antenna, window display & other low
speed drives. #921. Instr. incl. **\$5.95**
Stock No. 4949 is 1/4 H.P. 24 V. D.C. 2000
R.P.M. Mfg. by Pesco, applicable for 115 V.
A.C. Instructions incl. Base
mounted **\$3.95**

ALUMINUM AIR FILTERS Brand
New, 2" thick metallic mesh fil-
ters. Ideal for warm air fur-
naces, air conditioning units,
etc. Removes dirt, dust, lint, etc.
with efficiency & economy. Fire-
proof and odorless. Size 19"x
33"x2". Built to give many years of service.
Wt. 7 lbs. #P933. **\$2.95**
\$35.00 value.....

AIRCRAFT STARTING MOTOR. Operates on 12
to 32 volts. Gives high torque, slow speed
and tremendous power. Applicable for pulling or
moving heavy loads. Makes ideal winch or
heavy duty hoist. For belt or direct drive.
Mfg. by Jack & Heintz. O. cost over \$300.00.
Ship, wt. 55 lbs. **\$9.95** f.o.b.
Stock #J10. **\$9.95** KCMO.

ECLIPSE MOTOR & GEAR UNIT
Brand New including 24V. D.C. Motor.
Gear ratio 4:1, can be adapted for 2:1,
40:1 & 20:1. Ideal GARAGE DOOR
OPENER, HOIST, PUMP JACK, HAY-
LIFT, LAWN MOWER DRIVE, DRIVE
FOR POST DRILL, etc. Gear unit ap-
plicable for 110 A.C. Diagrams & in-
structions incl. Gov't cost \$221.00.
Wt. 23 lbs. **\$9.95** f.o.b.
only. **\$9.95** KCMO.

BEAM ROTATOR MOTOR New Powerful
geared motor for TV aerials, Ham, FM,
etc. Light weight, rugged. Shaft Speed
is 9 R.P.M. Built in mounting bracket.
(Applicable for 24V. D.C. and 110V.
A.C.) Instructions incl. **\$7.95**
Stock #A31. \$50.00 value.....

PESCO Centrifugal HEAVY DUTY
PUMP Including built in motor, 1/4
H.P. Applicable for 24V. D.C./A.C. or
110V. A.C. The motor is explosion
proof constructed for gasoline, fuel,
oils, water, fuel booster, etc. 3/4" hose
connection. Rated capacity, 400 G.P.H.
Instruction incl. Gov't cost **\$9.95**
\$172.00 Stock #659.....

PESCO LARGE VOLUME UTILITY PUMP
For Water, Oil, Insecticides, etc. Includ-
ing built in relief and by pass valve.
Capacity 400 G.P.H. 1/2" drive spline
shaft. 3/4" pipe inlet and outlets. En-
gineering data incl. **\$7.95**
Stock #6001 only.....

Adel Self-Priming ELECTRIC PUMP
For pumping light oils, oil burn-
ers, fluid metering, fuel pump, tool
post grinder, coolant, pressure lu-
bricating pump, etc. 1/30 H.P. rated 1200
R.P.M. Applicable for 24 V. D.C./A.C. or use
on 110 Volt A.C. Size 6 3/4"x3 1/2"x3 1/4", rated
3 G.P.H. Diagram and instr. **\$8.95**
incl. \$50.00 value.....

ROTARY PUMP for pumping
WATER FROM POOLS, OR BASE-
MENTS, SUMPS, pumping lubri-
cants. For Garden & lawn spray-
ers. For use with hydraulic cylinders, vacuum,
in dental lab, etc. Capacity 180 G.P.H., 200
lb. pressure, 29 in. vacuum. 500 to 3000
R.P.M.. Steel shaft Std. 1/2
in. Stock #101. Instr. incl. **\$7.50**

BENDIX VACUUM AIR GENERAL
PURPOSE PUMP for water, oil, in-
secticides. Air, fluid pressure or vacu-
um or as auto drain case pump. 150
G.P.H. Instructions incl. **\$8.95**
3/4" pipe ports. Stock #75

PESCO OIL HYDRAULIC PUMP. Gear Type,
high Pressure, heavy duty pump Rated .227
Cu. In. Rev. 198 G.P.H.
1500 P.S.I. Rotation either
direction, 3/4" inlet and out-
let ports. Shaft equipped
with male spline 1 1/16"
diameter. O. Gov't. cost over
\$150.00. Data in-
cluded. Stock #700 **\$9.95**

BENDIX HYDRAULIC PUMP and MOTOR
POWER UNIT. Motor is 1 1/2 H.P. 24V. D.C.
and operates on 12 and 32
Volt power. Rated 200
G.P.H. Pressure adjustable
up to 1500 P.S.I. Ideal
for Hyd. lift trucks, portable
loaders, etc. Gov't. cost
over \$300.00 **\$12.95**
New.....

HYDRAULIC HOSE 2000
P.S.I. Pressure for Oil
Fuel & Air. Highest Quality
Length Fittings Tube size Price
27" F & F 1/4" \$1.10
27" F & F 3/8" 1.15
40" F & F 3/4" 1.35
28" F & F 1/2" 1.45
17" F & F 5/16" .75
Add 20% for postage. Free Hose listing on request.

DILUTER DEMAND OXYGEN REGULATOR
Brand New #AN6004-1 "Build your own
Diving Lung" **\$8.95** post-
\$35.00 value.....

Stratopower Constant Displacement
HEAVY DUTY PUMP
For operating Hydraulic cylinders,
hydraulic motors on tractors, Bull-
dozers, Construction machinery. Lift
trucks. For fuel or oil transfer. In-
dustrial applications, etc. Delivers
up to 400 G.P.H. at 3750 R.P.M. Rated 1250
to 1400 P.S.I. 3750 to 4500 R.P.M. HAS
BUILT IN RELIEF AT HEAD. Rotation either
direction without adjustment. \$100.00 value.
Engineering data and instr.
incl. Stock #37. Wt. 8 lbs.. **\$17.50**

AIR OR OIL HYDRAULIC CYLINDERS
Stock #27—Single Action for Air or Hydraulic
2 3/4" Bore; 2 3/4" dia. shaft, 5/16" stroke, use
as snubber or Hyd. Cylinder. **\$6.95**
\$35.00 value.....

Stock #21—Double action 1 1/2" Bore,
6" Stroke, 3/4" dia. shaft. Clevis mount-
ing base and shaft end. Capacity 1160
lbs. with 1000 P.S.I. **\$8.95** post-
input. \$50.00 value.....
Stock #303—Double Action 2" Bore,
Stroke 1 1/4", 1 1/2" Dia. shaft. Overall
length shaft retracted 23". 2000 lbs.
capacity with 1000 PSI gives 2800 lbs.
with our strato- **\$14.50** f.o.b.
power. Wt. 14 lbs. **\$14.50** KCMO.

Stock No. 12 Hydraulic Cylinder Double Ac-
tion output 12560 lbs. with 1000 P.S.I. input.
Gives 17584 lbs. with our STRATOPW...
PUMP 1400 P.S.I. or will produce 34168 lbs.
with 3000 line pressure. Can also be operated
on low pressure system. 4" Bore, 10 1/2"
Stroke 1-5/16" Dia. Shaft, clevis mounting. O.
Gov't. cost **\$25.50** f.o.b.
\$300.00..... **\$25.50** KCMO.

PESCO HYDRAULIC FLOW EQUALIZER &
PRESSURE BALANCER VALVE.
Brand New. Guarantees equal flow
and equal pressure for Two cylin-
ders or Two systems. Capacity 360
G.P.H. 1500 P.S.I. Data & instruc-
tions incl. A \$75.00
value. Stock 1-0-397... **\$12.95**

FOUR WAY HYDRAULIC CONTROL VALVE
#329 For controlling 2 single action or 1 dou-
ble action cylinder. Puts pressure on 1 cylin-
der & opens exhaust or returns to neutral po-
sition, and locks cylinders. Has dual handle
control, 3/4" AC tube size **\$8.95** post-
ports. Brand New.....

LARGE VOLUME HYDRAULIC Pressure relief
valve 3/4" ports spring loaded 1250 P.S.I.
adjustable up to 3000 P.S.I. **\$4.95** post-
Brand New.....

**FOUR WAY HYDRAULIC CON-
TROL VALVE** for use with two
hydraulic double action cylinders.
Each cylinder may be operated
independently of the other or in
conjunction with the other. Or
may be locked in any of the cylin-
ders to hold the piston at any
required position. Brand New.
\$60.00 value **\$12.95** post-
Stock No. 620. Only.....

FOUR WAY SOLENOID
VALVE. OPERATES ON 24V.
D.C. & applicable for 115V.
A.C. Including manual over-
ride for operating 2 single
or 1 double action hydraulic
cyl., for remote control op-
erations, etc. 3/4"-18thd size ports. Instruc-
tions incl. Brand New
\$50.00 value. Stock #1213... **\$9.95**

**MULTIPLE FOUR WAY SOLE-
NOID VALVE UNIT** Consisting of
5 four way valves in one unit
connected to common pressure
& return connection with indi-
vidual connection to each valve. It will op-
erate 5 double action valves separately or in
any combination of 5. For 24V. D.C. & ap-
plicable for 110V. A.C. Instructions
incl. O. cost over \$200.00 #44R122 **\$17.50**

FOUR WAY HYDRAULIC CONTROL VALVE
Poppet type Valve shuts off on neu-
tral position. Has 3/4" A.C. Tube
ports -9/16- 20 thread, capacity
1500 P.S.I. Brand **\$5.95** post-
new. Stock #1032... **\$5.95** paid

**PESCO PRESSURE and RELIEF CON-
TROL VALVE** With 3 ports & external
pressure adjustment. Has 2 ports for
normal, one for relief line to fluid
supply or to pump inlet #575. Data
incl. \$25.00 value **\$4.95** post-
Brand New.....

VICKERS UNLOADING VALVE Brand New—By
passes full amount output of the pump while
the cylinder is not in operation. Takes start-
ing load off of electric motor driving the
pump. 1/2" AC TUBE PORTS **\$8.50** post-
Price.....

ALTERNATING SHUT-OFF VALVE
Brand New. High pressure. Operates
by worm-gear cam operating
poppets to alternately close &
open either pair of four ports.
Standard 3/4" pipe **\$5.50** post-
ports. \$50.00 value only.....

Hydraulic Accumulators — Bendix Ball Type
Dia. 5 1/2". Built to stand 2000
P.S.I. Stock #A-65. Wt. 4 lbs. only. **\$5.95**
BENDIX ACCUMULATOR. Ball Type. Dia. 10 1/2"
Built to stand 2000 P.S.I.
Wt. 15 lbs. Stock #A-85. Only... **\$15.50**

GENERAL SALVAGE CO., 2922 E. 27 St., Dept. 793, Kansas City, Mo.

seen escorting a woman to a train bound for New York. At the border, agents detained the woman and took her off the train. They examined her baggage and an inspectress thoroughly checked her clothing and person. Not even one diamond chip could they find. Because the woman could not continue her journey by train until the following day, the agents found her a hotel room.

The following morning the woman caught the train to New York. That same afternoon the lavatory in her hotel room became plugged. A plumber, called by the manager, fished a package out of the trap. Hundreds of diamonds tumbled out into the startled plumber's hands. The following day the same bowl stopped up again, and another package of diamonds was found. A total of \$121,351 worth of diamonds had been headed down the drain.

The man later was arrested in New York, convicted and sentenced. Because the woman pleaded guilty and testified for the government, she was placed on probation.

Surprisingly inexpensive items are sometimes smuggled across the border, but the pay-off may be big according to Chester A. Emerick, Deputy Commissioner of Customs. Well-known hoodlums recently have muscled in on a lush new racket, dealing across the border and under the counter in

—of all things—parakeets and rose-breasted cockatoos. But don't think this latest racket is strictly for the birds. Parakeet-smuggling has grown until the "take" has been estimated at \$250,000 a year.

A few months ago customs agents nabbed three persons and starting rounding up others on a charge of smuggling thousands of birds a year into this country from Mexico. "Runners" are occasionally seized at isolated points along the border as they attempt to deliver birds to confederates.

Smuggled parakeets, according to shop owners, are selling at about six dollars apiece—four dollars below the average market price, but still pegged high enough to put total receipts for the racket into the big-time class. A few really rare birds are bringing up to \$1500 apiece.

The innocent little birds have become so valuable that they have even set the smugglers to fighting among themselves. Not long ago a valuable truckload of 1600 parakeets was hijacked on a lonely road in California. The men who carried off the job—and the birds—were members of a rival smuggling gang.

The underworld trade in parakeets and cockatoos is just one example of some of the more wacky rackets that smugglers have developed in the uneasy era since

(Continued to page 252)

UNCLE WALTER

IT SMELLS GRAND



IT PACKS RIGHT

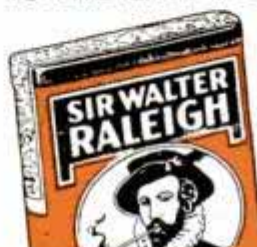


IT SMOKES SWEET



IT CAN'T BITE!

SIR WALTER RALEIGH'S BLEND OF CHOICE KENTUCKY BURLEYS IS EXTRA-AGED TO GUARD AGAINST TONGUE BITE, AND SIR WALTER RALEIGH NEVER LEAVES A SOGGY HEEL IN YOUR PIPE. STAYS LIT TO THE LAST PUFF.



For The Smoothest, Most Perfect Finishes!... Use

DREMEL

STRAIGHT-LINE ACTION

SANDERS

Only DREMEL Offers All These Features:

WORLD'S FINEST FINISHING SANDERS — Patented Straight-Line Action sands with the grain of the wood—eliminates cross-grain scratches and orbital swirls.

MORE SANDING SURFACE PER DOLLAR means more work done. Faster action (14,400 sanding strokes per min.); more than three times as fast as other type sanders!

POWERFUL, high-speed, reciprocating motor (110 V. 60 cycle A.C.)

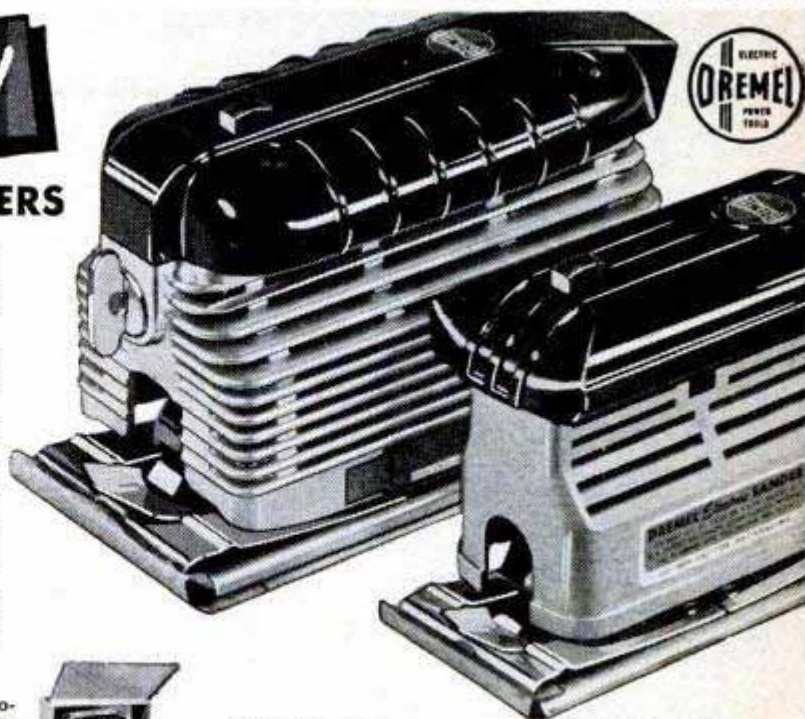
EASY, ONE-HAND OPERATION less tiring on vertical and overhead operations. Sands into corners—other tight places.

TROUBLE-FREE USE assured. Only two moving parts; never needs oiling. No armatures, brushes, gears or bearings to wear out and replace.

FREE SANDING GUIDE—A handy, 16-page "How-to-do-it" booklet containing helpful hints on sanding and refinishing procedures packed FREE with each Dremel Sander. Extra copies, 25c.

MAKE THIS COMPARISON TEST

Sand a piece of wood by hand, using the four distinct sander motions shown below. Note how small scratches and swirl marks appear whenever the slightest cross-grain motion is used. Now compare these results with the beautiful, satin-smooth, absolutely scratch-free surface produced only by straight-line, with-the-grain sanding. You'll see why we guarantee professional-quality, scratch-free finishes. You'll be convinced that Dremel Straight-Line Action produces the results you want. Try it before you buy!



MODEL 2000

Heavy-duty model: 21 sq. in. (3 1/4" x 7") sanding base. Price includes sturdy steel storage case, 25 asst'd. abrasives \$24.50 1 polishing pad.

MODEL "A"

Hobby and household model sander, polisher, massager (above, right): 12 sq. in. (2 3/4" x 5 3/4") sanding base. Price includes 6 abrasives; 1 polishing pad, 1 massage pad. \$14.85

SEE YOUR LOCAL DEALER: Dremel Tools are sold at better dealers everywhere. If your dealer can't supply, order direct on a five-day trial, money-back guarantee. Remit in full, and we will ship postpaid. Or, send only \$2.00 now, pay postman balance plus postage and C.O.D. fee.

DREMEL MFG. CO., Dept. 113-J, Racine, Wis.



Find HIDDEN TREASURES

GEIGER COUNTERS (as shown) for Uranium Detection. **TREASURE DETECTORS** for gold, silver, etc. Lightweight, ultra sensitive. Best at any price. Also mineralights.

• INFORMATION FREE •
Detectron Co.
5420 Vineland, North Hollywood, Calif

ACCURATE, gas powered

WRITE FOR CATALOG



Crosman

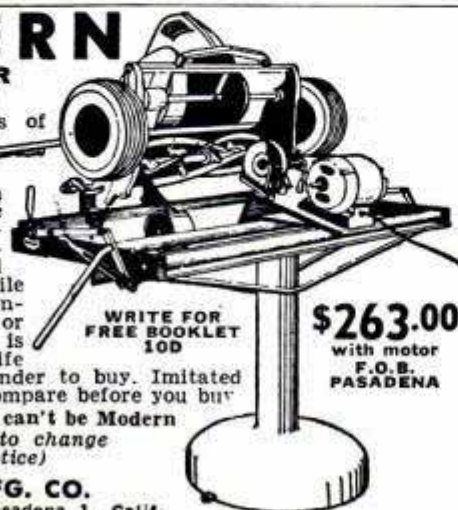
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World War II. Wacky, that is, until you consider the "take" on these products that are sneaked both ways across our borders.

Although the customs service ordinarily deals only with contraband smuggled into the United States, it has recently been given the job of aiding the Office of International Trade in stopping or controlling the flow of certain goods out of the country.

Items seized within the past few months—bound one way or the other—include feathers, tamales, metal pipe disguised as fence posts, sheets of stainless steel, sulfa drugs, clothing, cameras, watches, oscilloscopes, scarce metals and a chemical used in brewing beer. One machine, shipped out as a button-stem maker, turned out to be an assembly line for electronic tubes. A dishonest but enterprising bicyclist along the Mexican border smuggled in literally tons of meat, a few pounds at a time, before he was apprehended.

Why have the smuggling racketeers gone in for such odd items? As far as the products smuggled out of this country, many are in such short supply the world over (penicillin and sulfa drugs) that they command exorbitant prices. Others are restricted because they are being stockpiled in this country (stainless steel) or because they are as valuable as weapons in the hands of a potential enemy (electronic-tube machinery).

Among the most determined and ludicrous of all smugglers, according to the agents are—the salami smugglers! Immigrants and their families have acquired a taste for a particular European salami, a sausage that apparently can't be duplicated in this country. Because of the spread of hoof-and-mouth disease, meats were placed on the contraband list. The result was a brisk personal trade in smuggled salami.

Recently an attractive lady with an expensive fur coat draped over her arm walked down the gangplank in New York harbor. A watchful baggage inspector saw guilt in all her actions, so he gave her luggage a thorough check. No results. Nevertheless he was so sure she was carrying contraband that he ordered an inspectress to make a personal search, including all the clothing the woman was wearing. Her heels were probed. Still no results.

The agent couldn't believe his senses. With his almost infallible sixth sense, he knew the woman carried contraband. Suddenly the simple solution flashed into his mind. Though her baggage and clothing had been searched, she had been carrying the fur coat.

And there he found the loot, carefully sewn into the lining of the expensive coat—three long links of salami!

★ ★ ★

Which of these jobs need doing around your home?



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☐ Make this smart patio set in a single weekend with work-speeding panels of Exterior fir plywood.



☐ Build smart, modern furniture with fir plywood. Your dealer has new small-size handy panels.



☐ Low-cost fir plywood built-ins give you neat, compact storage... plus far more usable floor space.



CHECKLIST FOR JOBS **HE** WANTS DONE



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☐ No garage? Here's an attractive carport you can build yourself with light, strong Exterior plywood.



☐ Remodeling? Fir plywood goes up fast—gives you the luxury of real wood paneling at low cost.



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Drawing a straight line on a curved surface isn't easy. Next time you have to cut curtain poles, furniture legs, etc., just run a strip of FLEXBAC Masking Tape around the piece for a sawing guide. Gives you a line you can really see, and it peels off quickly, cleanly.

Index tabs for notebooks, recipe cards and such are easy to make. Use short strips of FLEXBAC Masking Tape, folded over.

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Ask your hardware store or lumber dealer for FLEXBAC Masking Tape by CARBORUNDUM. Keep it on hand!

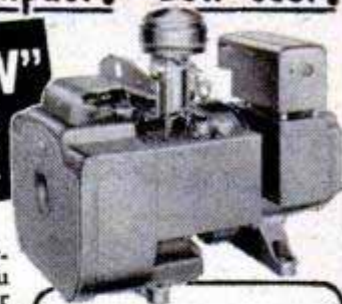
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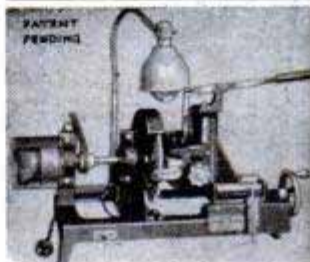
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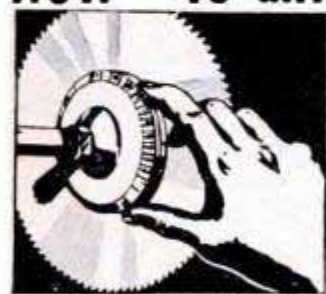
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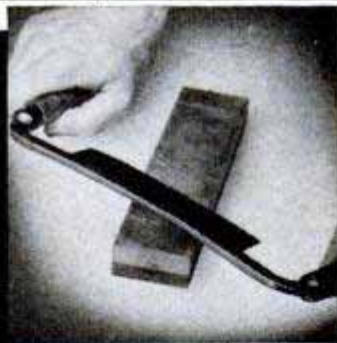


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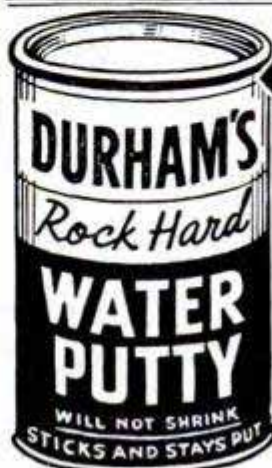
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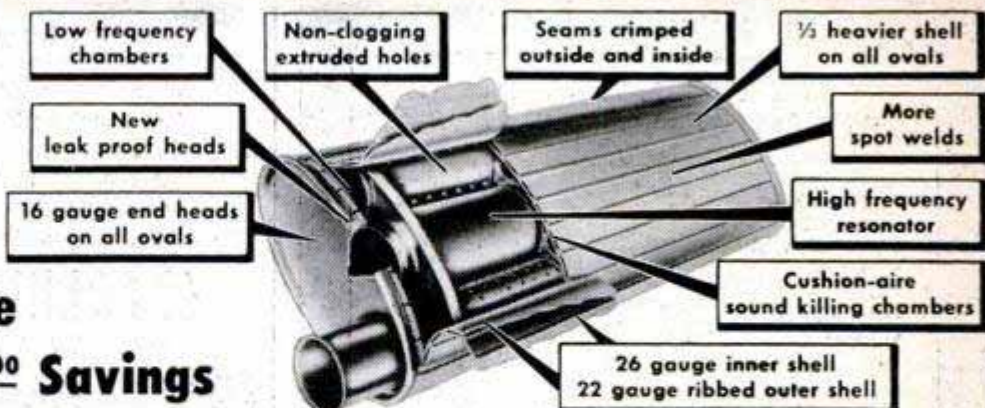
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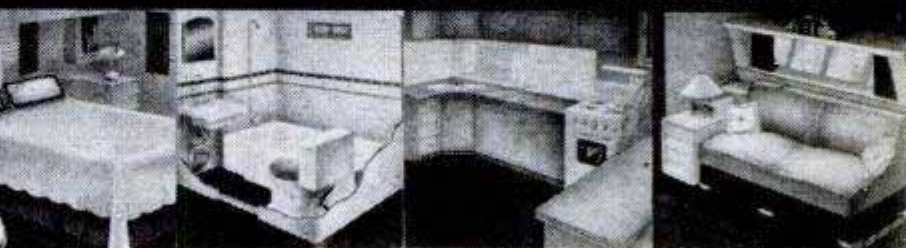
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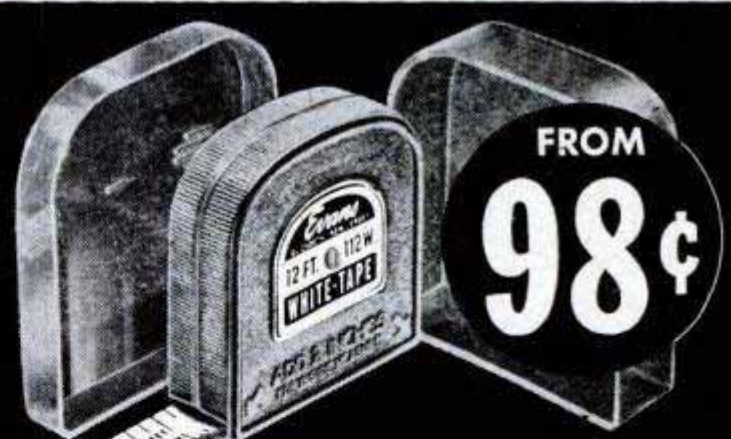
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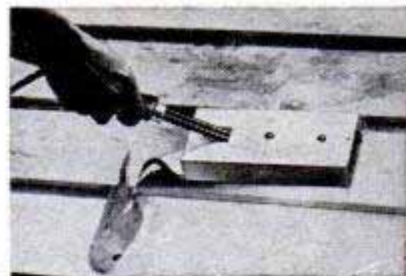
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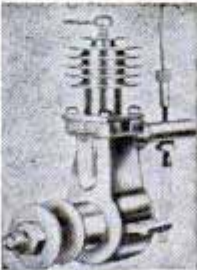


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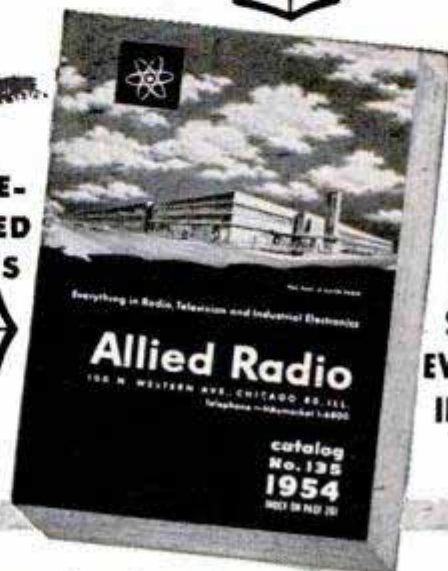


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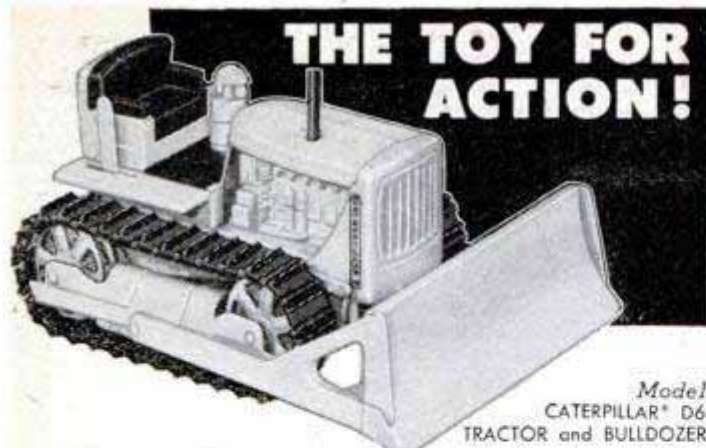
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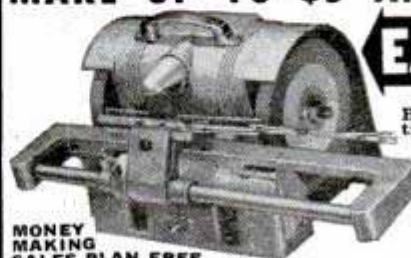


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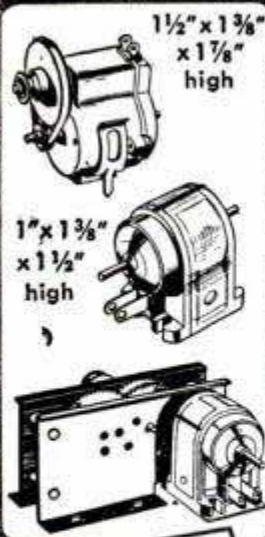
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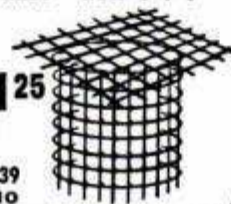
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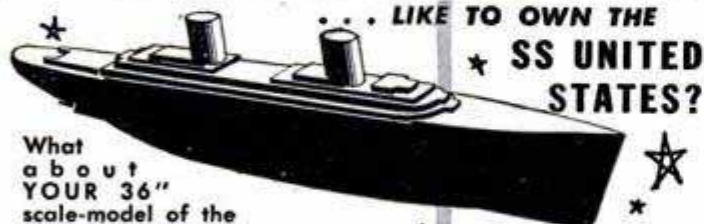


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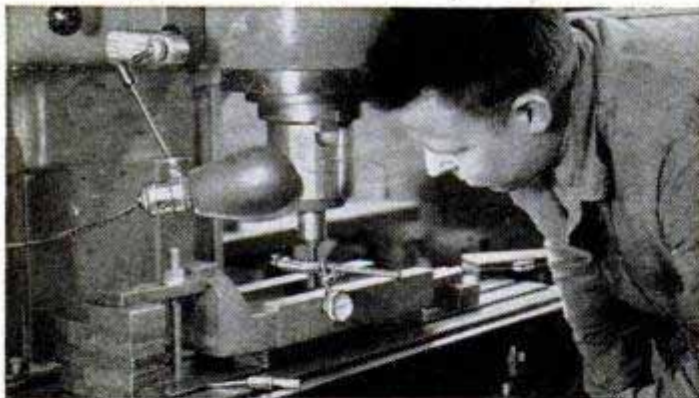
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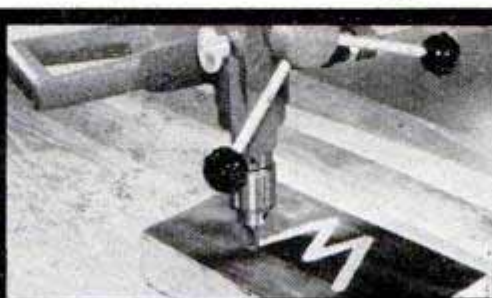
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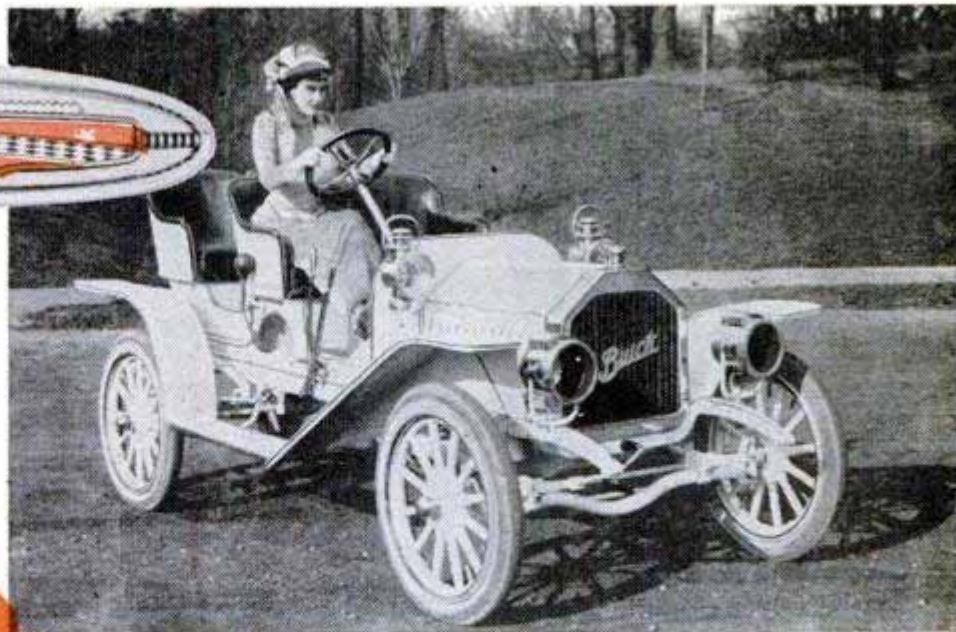
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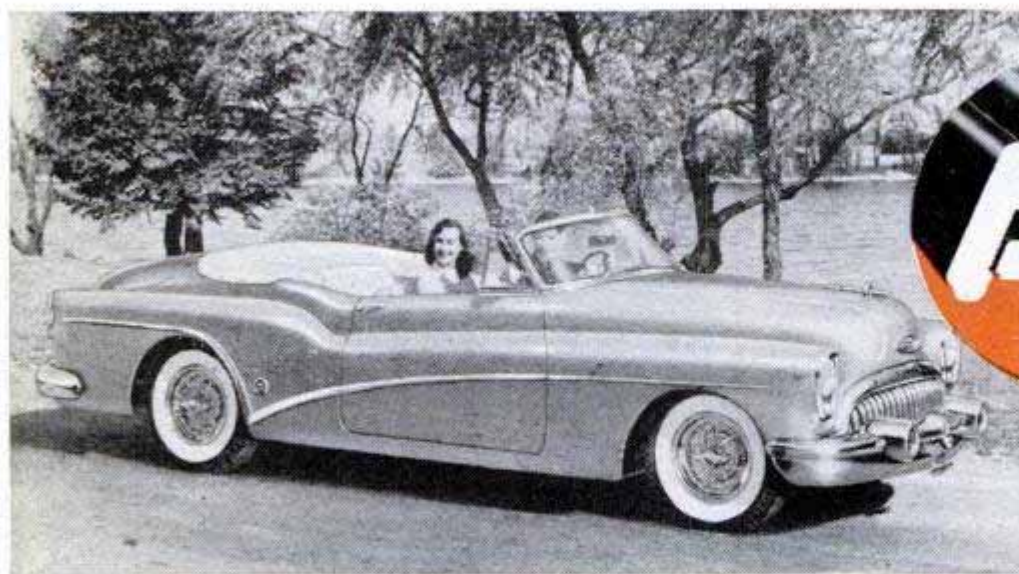
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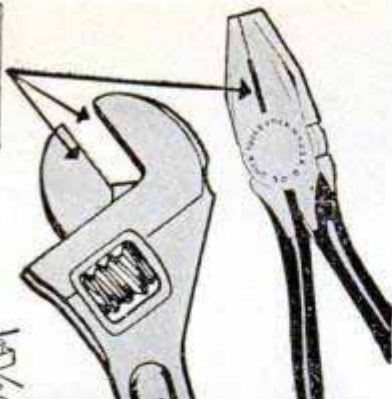
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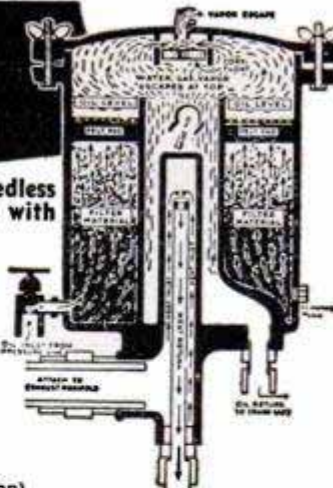
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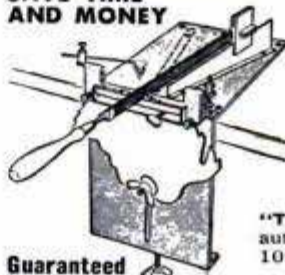


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Now comes the best news of all. Parents especially are glad to know that here is a power jig saw that is safe also for boys and girls to use. Accidental injuries on this machine, even the slightest cuts, are very rare. Serious injuries are impossible. Now that may seem strange to you but the reason is very simple . . . the Syncro blade does not "pull" the "work" or finger towards it as belt-driven jig saw blades do.

If you happen to have seen a Boy Scout Troop doing handicraft metal work, you will always find a jig saw one of their main tools. Perhaps you have various ideas that you would like to work out in metal; a name plate out of aluminum, a shadow lamp out of copper, or book ends out of brass. You can do all these things on this same machine using the same one blade to cut all those different types of metal, as well as wood, cardboard, etc.



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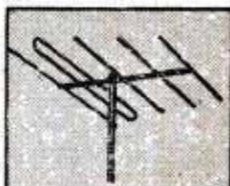
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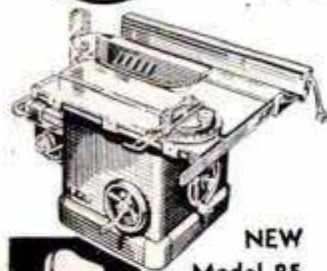
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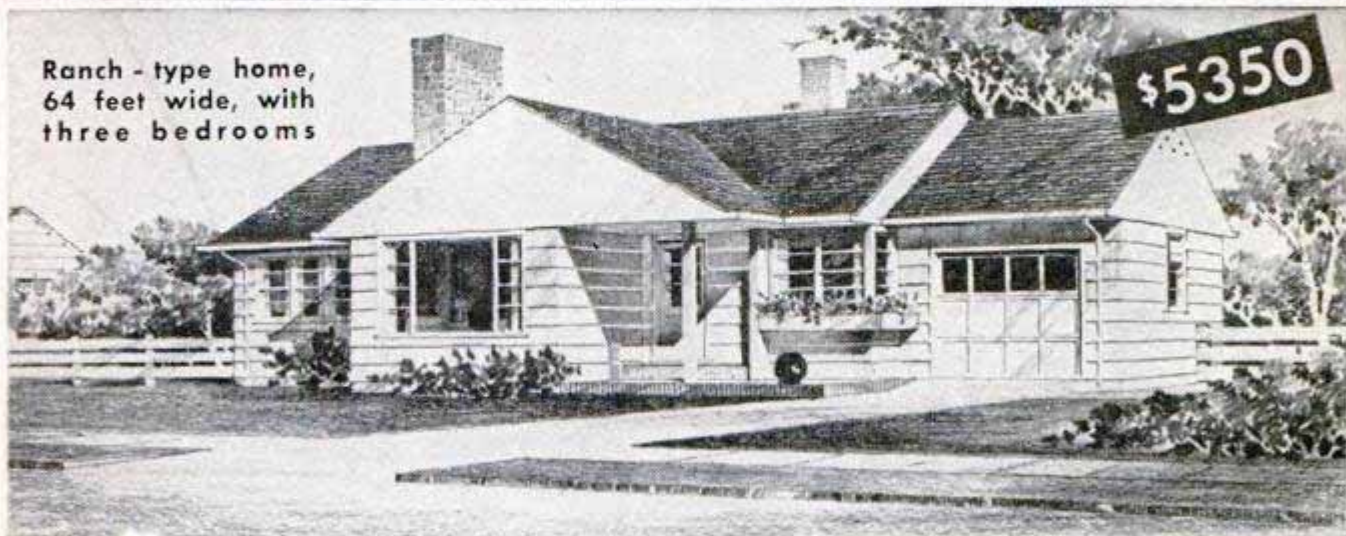


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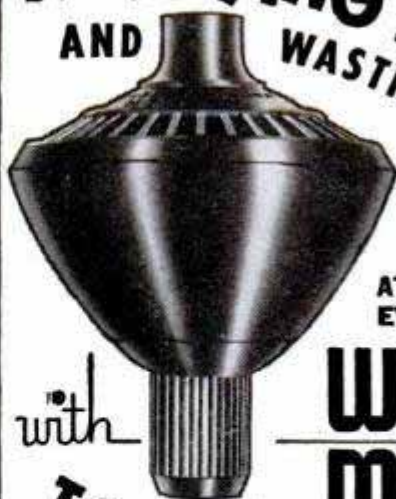
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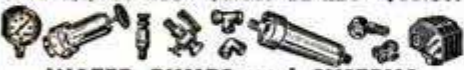
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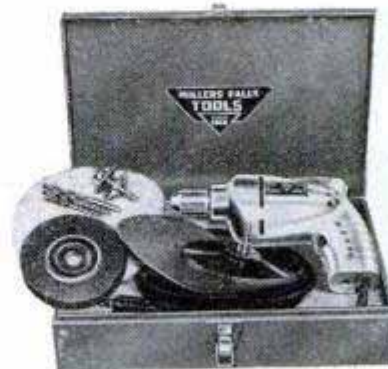
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MAIL COUPON AND 25¢ CASH FOR "FOLDING BARBECUE TABLE" PLANS

MONSANTO CHEMICAL COMPANY

Merchandising Division
1700 South Second Street
St. Louis 4, Missouri

Enclosed find 25 cents (25¢) for which please send plans and specifications for Folding Barbecue Table (Monsanto *Rez* Moderns, Plan No. 7).

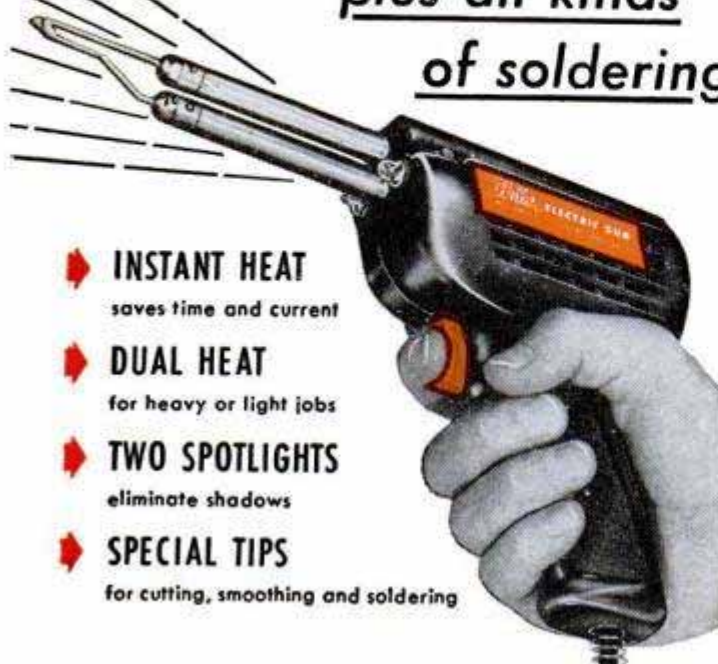
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FOR DOZENS OF HOBBY AND HOMECRAFT JOBS

*plus all kinds
of soldering*



- ♦ **INSTANT HEAT**
saves time and current
- ♦ **DUAL HEAT**
for heavy or light jobs
- ♦ **TWO SPOTLIGHTS**
eliminate shadows
- ♦ **SPECIAL TIPS**
for cutting, smoothing and soldering

Here's the fastest, most efficient soldering tool ever, and by simple interchange of tips it does dozens of other money-saving jobs. Thousands are in use by Radio and TV technicians and professional mechanics. 4 models up to 275 watts. See them at your Hardware Dealer, or write for catalog describing uses.



Cuts plastic tile



Seals freezer packages



Removes hard putty

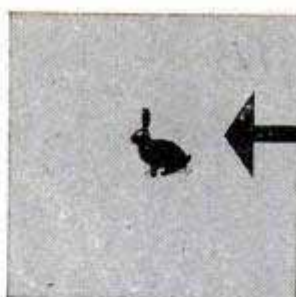


Repairs furniture scratches

Weller ELECTRIC GUNS

816 Packer Street, Easton, Pa.

Available at Better Hardware Stores Everywhere



THIS

is the way your target looks to the naked eye.



THIS

is the way the same target looks thru a Mossberg 4-power scope.

USERS TELL US that shooting with Mossberg scopes is the best shooting fun they've ever had!

Mossberg scopes fit almost all makes of rifles up to 25-20 cal. They're fine optical instruments; all lenses are hard coated; sighting adjustments are amazingly easy — and the mounts are extremely firm and secure.

YOUR DEALER INVITES YOU TO SEE THEM

Models 4M4 and 2M4
\$995

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No sales at factory

39709 St. John St., New Haven, Conn.

What to Make with CONCRETE

Even little concrete jobs cost big money — mostly for labor. Get Popular Mechanics **WHAT TO MAKE WITH CONCRETE** and save all the labor cost while making your home or farm ship-shape. Book shows all — tells all — how to make the right mixture, plan, apply and gives 50 professional short cuts. Hundreds of pictures. Only \$2.00 postpaid. Order today. Money back if not pleased.

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NEW, EXCLUSIVE LOK-BLOK
LOCKS BLADE IN HANDLE

Now
TWIST & IMPACT PROOF!

Plus many other great features and unsurpassed quality... yet cost no more than ordinary drivers!

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HOLD-E-ZEE
The Original
Automatic Grip
SCREWDRIVERS

EDITORS' IMPARTIAL TESTS PROVE:

New Self-Charging Battery Outlasts, Outperforms Others 221%

A few months ago, we started producing a new battery which we frankly believe to be many years ahead of its time. When we announced that this new battery developed 15 amperes more power than other batteries and would automatically bounce back to life again and again after being deliberately and completely discharged, technical editors of leading magazines raised their eyebrows.

We named it the *Lifetime Battery*—not because we expected it to last forever, or even the life of the owner—but because of its *life* (power) and the *time* it would last. We guaranteed it for *six years*; a test battery is still in daily use after 11 years! Editors said—and we don't blame them for being skeptical—"sounds too good to be true." One publisher even refused our advertising until he personally tested every claim we made.

One of the editors said: "Let us test this battery, any way we see fit. If it does what you claim, it's news our readers will be interested in. If it's no good, our readers will be interested in that, too, and that's the way we'll write the story." We said "go ahead" and they took a standard *Lifetime Battery* off the production line and went to work.

You may have read the result of the first test in a famous automotive magazine (name on request). Using two well-known batteries (possibly the best-known high-quality batteries in the world) for comparison, they first ran the *Lifetime Battery* down completely and let it re-charge itself automatically. They repeated this test 43 times the first day, then compared its strength with the other two batteries. Results: the *Lifetime Battery* was 204% stronger than the strongest of the other two batteries. They discharged the *Lifetime Battery* another 20 times, allowing it to re-charge itself automatically each time, and compared all batteries again: the *Lifetime Battery* was now 213% stronger than one battery, 221% stronger than the other! Next, they put a punishing 300-amp load on the *Lifetime Battery*; it survived that in good shape. So they repeated the self-recharging test again and finally concluded: "...unprecedented life expectancy... remarkable recuperative characteristics... outperformed the others in every respect and by a comfortable margin... an outstanding value."

The editor of another magazine (name on request) heard about the tests and asked to "give the thing a *real* test, one that would burn up the average battery." We gave him the *same battery* and challenged him to "finish it off." He installed it in his own car and drove the car on the *battery alone*, shifting gears as he would normally, until his "fingers were sore from holding the starter key... I hate to admit it, but I was outlasted by a battery."

Still another editor wrote: "...definite battery improvement... greater recuperative power, greater initial output... obviously high quality."

During independent tests in Alaska and the U.S., the Lifetime Battery was intentionally discharged under sub-freezing conditions, recharged itself automatically & started car at once!



Engineered for Cold Climates

Soon after the *Lifetime Battery* went into production, we selected a few dealers in northern U.S. and Alaska, shipped them a few batteries and waited to see how the dealers and the public would react. Our Alaska dealer told us that before presenting it to his customers, he was going to give the battery an Arctic test: discharge it completely then freeze it at 30 below zero for 72 hours. Result: the battery had recharged itself and immediately started the car. Immediately we received a telegraphed order from Alaska for \$6,043 worth of *Lifetime Batteries*!

6-Year Guarantee Saves You Up to \$107

The average deluxe battery lasts 1.4 years at a typical cost of \$25.00, or \$107.00 for a 6-year period. This arithmetic is making sense to people who are tired of throwing money away on batteries that just won't hold up. We believe it will make sense to you, too—particularly since the *Lifetime Battery* you buy now can easily be transferred to your new car whenever you trade in.

12-volt and 6-volt Available

Here's more arithmetic that makes sense: the *Lifetime Battery* sells in the U.S. at one price for all cars: \$29.95 for 6-volt, \$34.95 for 12-volt including excise tax.



Supply Limited: Order Today by Mail!

Although plant facilities are being expanded, supply is still limited. If your dealer can't supply you, order direct by mail from the factory; we pay freight.

CONTINENTAL MANUFACTURING CORPORATION (Marketing Division, Consolidated Engineers)

Dept. BM-9, Washington Boulevard at Motor Avenue, Culver City, California

Dealers NOW BEING APPOINTED TO HANDLE DEMAND

Dealerships are now being awarded to take care of demand generated by \$1,000,000 advertising campaign plus articles in national magazines. Write today for full information, including reprints of editors' tests and case histories from present dealers.

Continental Manufacturing Corporation, Dept. BM-9
Washington Blvd. at Motor Ave., Culver City, Calif.

Please ship *Lifetime Battery* at once:

- ☐ 6-volt (\$29.95 including tax)
☐ 12-volt (\$34.95 including tax)

for

(make, model, year of car)

- ☐ I enclose cash, check, or money order: you pay shipping cost.
☐ I enclose \$5 deposit, will pay balance & shipping costs C.O.D.

Name

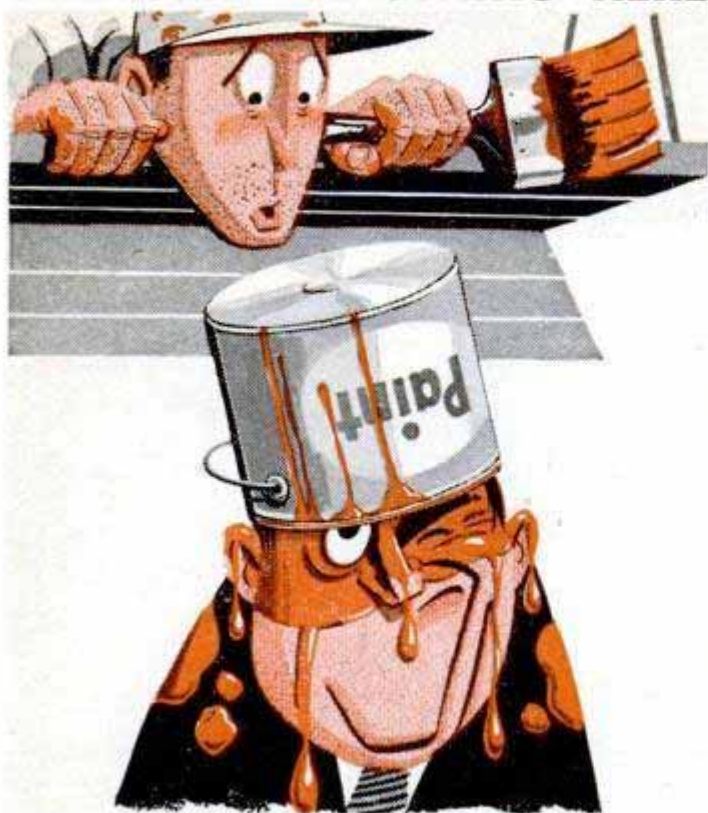
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SELF-CONTROL STARTS HERE



AND TO RESTORE
CAR PERFORMANCE

OIL-CONTROL STARTS HERE

To stop oil-pumping, replace worn engine
connecting rod bearings

An oil-pumping engine and sluggish car performance can make you see red! But don't blame the piston rings for oil pumping and poor performance caused by worn engine bearings. When bearings are worn, they decrease the efficiency and shorten the life of the best of new piston rings. Give the rings a chance to do their own job — check for *worn engine bearings*, too! Replace, in sets, with Genuine Federal-Mogul Oil-Control Bearings, for renewed power and economy. Ask your mechanic!



FEDERAL-MOGUL SERVICE

(Division of Federal-Mogul Corporation)
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CONTROL OIL-PUMPING
WHERE IT STARTS—REPLACE WITH

FEDERAL-MOGUL
OIL CONTROL BEARINGS



New "EDGER-'N'-HEDGER"

FITS ANY 1/4" ELECTRIC DRILL



ONLY \$9.95

Now you can trim grass, shrubs, bushes, weeds—even knee-high grass—quickly, electrically, without getting on your hands and knees! New Edger-'n'-Hedger reaches every nook and cranny, gives unruly grass a close "crew cut". Use it with handle as a miniature "power mower" to edge walls and walks; remove handle and trim shrubs and hedge. Won't clog or stall. Whirling blade can't strike operator, walls or rocks. Easy one-hand operation. Comes complete with removable handle at the lowest price on the market—only \$9.95!

At your dealer or send cash, check or M.O.

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Say You Saw It in POPULAR MECHANICS

TRAILER AXLE



For Boat & Utility Trailers

29.50

16" Wheels

ALL PURPOSE WINCH



For a Million Uses

9.25

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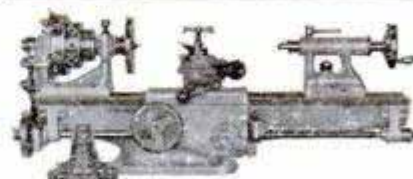
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Everything—shop tools, hunting, fishing, making money at home, concrete work, welding, mail order, plastics, painting, carpentry, photography, boat building, gardening, auto repair, hobbies, home building—is listed in the new 40-page 1953 catalog of easy-to-understand Popular Mechanics books. Write for your free copy now! Dept. CT2.

Popular Mechanics Press, 200 E. Ontario, Chicago 11



**BUILD
YOUR OWN
MACHINE TOOLS
CASTINGS—DRAWINGS**

Catalog with complete construction drawings of this 8 inch Modelmaker screw cutting lathe with milling, grinding and hand shaper attachments, 25 cents postpaid, or send one dollar for drawings of three lathes, three milling machines and six inch crank shaper. Refund on castings order.

POOTATUCK CORPORATION, 100 Sammis Pl., Stratford, Conn.

ASSEMBLE IT YOURSELF — SAVE MONEY!

Automatic COMPRESSOR UNIT With 22 Gallon Tank

and these outstanding features: 1/3 H.P., heavy duty capacitor motor, 110 volt A.C. 2" bore, 1-3/4" stroke, 125 lbs. pressure. 2.8 cu. ft. Stainless steel valves, 3 piston rings, aluminum piston. Solid brass valve retainers. 2" x 8" rubber-tired wheels. 10 ft. cord and plug, 20 ft. air hose and tire chuck, air intake filter, dust-proof crankcase. Positive lubrication, balanced crankshaft, easy-grip handle bar, fan-cooled pulley, automatic pressure switch, safety valve, silent check valve. You save \$25.55 on this complete outfit, "knock-down". Simple instructions, for easy assembling included. Regular \$175 value. Shipping Wt., 150 lbs.

Brand New!

Shipped
K.D.

\$72⁹⁵

Same outfit,
fully assembled,
\$98.50



BRAND NEW



Complete Assembly for PORTABLE SPRAY OUTFIT

WITH 1/3 H.P. HEAVY DUTY MOTOR

Unbelievable Value! Paint sprayer is mounted on 7-1/2 x 25 inch tank, 1/3 H.P. 110 V. 60 cy. Heavy duty motor, 10 ft. cord and plug, V belt drive. Piston type compressor with 2 compression rings, 1 oil ring, 2 inch bore, 1-3/4 inch stroke. Displacement 2.86 c.f.m. at 60 lbs. pressure. Safety valve. External and internal atomizing gun, fan, round and angle spray nozzles; quart cup; Maintains 35 to 40 lbs. working pressure. Oil and water extractor, 20 ft. heavy duty two-braid air hose with leakproof fittings. Complete with carrying handle. Wt. 90 lbs. You can't match this outfit at twice the price! You save \$20 if you assemble it yourself. Complete instructions included.

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Same outfit
fully assembled
\$67.50

NEW CATALOG

Send 10c postage for NEW CATALOG of compressors, paint spray units, light plants, motors and many more items. Also tanks of all sizes, stainless and carbon steel.

Prices F.O.B. Chicago. Order from this ad. On Money Back Guarantee. Send check or money order. 25% Deposit on C.O.D. orders.

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Perform near-miracles with this really new TOOL

Reaches around the tubing or pipe
and down on the fitting...

SLASHES WORKING TIME!

Now you can own a TAC Open End ratchet Wrench set, complete with your most needed sizes of TAC snap-in open end sockets. Slips over and around pipe, tubing, cable, conduit, spark plugs, long studs, etc. — then down on the fitting. Fast ratcheting action saves up to 85% of your time. Especially good in tight working areas: will ratchet with as little as 7° handle swing. Tremendous torque strength. A favorite in Army-Navy-Air Force, and Industry. Now available to you. Write for catalog, prices and name of nearest dealer.



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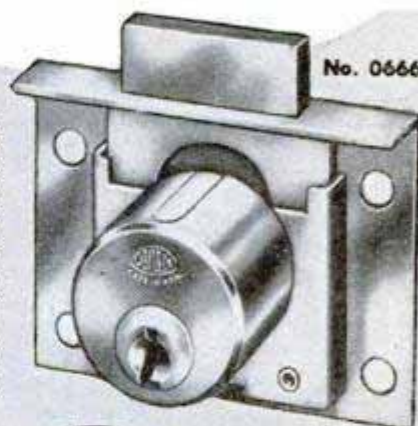
TAC OPEN-END ratchet wrench



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There's a CORBIN CABINET LOCK for every purpose

Put easy-to-install Corbin Cabinet Locks on ALL your desks, sliding doors, closets, drawers, chests, wardrobes, tool boxes. They make your work easier... make it look better. And they keep valuables secure... keep children away from medicines, guns, etc.



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CORBIN CABINET LOCK Division

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Schupack's Amazing Tool Bargains! All Brand New! Save up to 100%!

112 PIECE ASSORTMENT FOR ELECTRIC GRINDER \$3.95
 \$10.00 VALUE — ONLY
 Here's what you get! Mounted Stones on 1/4" mandrel, Drum Sander, Sanding Sleeves for sander, Rotary Cutters, Wire Scratch Brush, Bristle Brushes, Circular Saw, Buffing Wheel, Grinding Wheel, Rubber Polishing Wheel, Cut-off Wheels, Rubber Cylinder, Mandrels to fit above tool, ass't'd Sanding Discs, Sharpening Stone, etc.

18 ROTARY CUTTERS \$5.85
 \$13.50 Value
 Illustrated 1/2 actual size
 Assorted sizes cutter on 1/4" or 3/32" shank. Will fit all hand grinders. Ideal for cutting wood, metal, or plastic. Brand new.

2 DRUM SANDERS \$1.50
 With 12 Bands in Assorted Grits. 1 1/2" dia. x 1" long on 1/4" arbor with 12 bands
ONE DRUM, 1" DIA. x 1" LONG ON 1/4" ARBOR WITH 6 EXTRA SLEEVES \$1.00

7 High Speed Twist Woodworkers' Drills \$2.00
 Sensational Value at 15 DRILLS FOR ONLY \$2.00!
 Order Today! 7 Popular sizes—up to 1/2" dia. Brand new, ideal for home or shop use. Fits all standard chucks. 1/2" dia. is from \$1.95. 1/4" dia. is from \$1.95. 3/8" dia. is from \$1.95. 1/2" dia. is from \$1.95. Brand new, popular sizes.

FLEXIBLE SHAFT — ONLY \$4.95
 Fits all electric drills & hand power tools. 35 3/4" long. Oilite bearing. Core of specially wound, high carbon steel wire in flexible steel casing. Will accommodate tool shafts up to 1 1/8" dia. For lathes, electric drills, etc.

12 MINIATURE CUTTERS \$1.00
 FOR CUTTING WOOD, PLASTIC, or METAL. Actual size. Ass't. shapers on 3/32" shank. For die makers, home workshop, etc.
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 and points on 1/4" Mandrel
 For grinding on plastic, wood soft and hard metals. Regular \$8.40 List Val. 12 wheels on 1/4" Mandrel \$2.75
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Drive Screws, Nuts, Bolts 10 TIMES FASTER with DRIL-O-DRIVER

Picture shows greatest little invention ever designed to save time and work for carpenters, cabinet makers, home craftsmen, hobbyists, electricians, plumbers, farmers — everybody who uses tools. The new DRIL-O-DRIVER is an Electric Drill Attachment that can be used with any quarter inch electric drill. It drives slotted and Phillips screws, nuts and bolts. Operator controls speed and force of drive. Designed to give durable, useful long years of service. Small enough to fit any kit. Unconditionally guaranteed. If your dealer does not stock Dril-O-Driver, send \$9.95 today for your DRIL-O-DRIVER, Screw Driver Bit and Drilo "Magic Connector" an adapter enabling you to use 54 standard tools available to electric drill owners. We pay postage.

NOW ONLY \$9.95
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ACE TOOLS



Be permanently toolled-up for every operation on your Metal Cutting Lathe.

No. 8-A Ace Tool Set for 9" and 10" Swing Lathes—fits shank size 3/4" x 3/4". Includes Turning, Cutting-off, Boring, Knurling and Threading Tools with high speed cutters. blades and wrenches. 8 complete tools in fitted steel case—nothing else to buy. See your local dealer or order direct.

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\$26.95



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Self generating photo cell—Dia. 1-3/16 inch. This cell turns light directly into electricity—outside power needed. Make your own Exp. meter—Foot candle light meter, use with a micro-ampere meter. Output as much as 5 milli. sunlight. Will operate meter type relays directly. Shipped postpaid with instruction sheet, ONLY \$1.00.

ELECTRONIC PRODUCTS CO., Dept. C, St. Charles, Ill.

All the Facts You Need About PORTABLE ELECTRIC TOOLS!

New CATALOG! Hundreds of time and money-saving ideas for hobbyists, builders, professional woodworkers! New 28-page catalog describes latest portable electric tools—how they work—what they do—where they save. Explains features and uses of electric saws, belt sanders, orbital sanders, disc

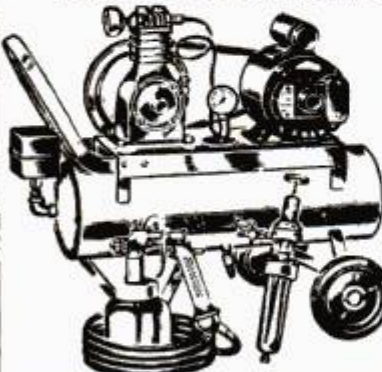
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ONLY 10c

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BUY DIRECT MANUFACTURER TO YOU!



AUTOMATIC AIR COMPRESSOR

1/2 H.P. Heavy Duty Motor, 115-V, 60 cy., 1 ph., 1725 RPM, overload protected. Quincy X2 — 3 CFM — 100-150 lbs. Compressor — 2 in. x 1 3/4 bore & stroke. Furnas Automatic Adjustable Pressure Switch. Tank 8" x 26". Rubber Tired Wheels and Handle. Speedy External Atomizing Quart Spray Gun, Pressure Regulator, Filter, Gauge, Hose & Tie Chuck, Check Valve, Safety Valve, V-Belt Drive. Completely Assembled into a Compact Balanced Unit. Ready To Use, 1/2 H.P. = \$55.50. Fob Chicago. Only \$89.00. SAVE \$10.00. 1/2 H.P. Outfit, knocked down, you assemble, = \$K-53. Fob Chicago. Only \$79.00.

KNOCK DOWN LARGER PORTABLE UNITS

= \$K-75—3/4 H.P. Motor 12" x 24" Stainless Steel Tank One Cyl. 4.5 CFM Compressor. All Accessories. You Assemble. \$123.50 Fob. = \$K-100—1 H.P. Motor 15"x30" Tank Twin Cylinder 9 CFM Compressor. All Accessories. You Assemble \$169.50 Fob.

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New MOTOR BARGAINS for Home, Farm & Industry



1/2 H.P. Dayton, 3450 RPM IND type \$18.50 Westinghouse, DBL shafts, 1725 RPM \$22.50 Westinghouse, dbl. shafts, 3450 RPM \$23.50 3/4 H.P. Eicor, capacitor type ball org., 1725 RPM \$32.50 General Electric, cap. ball org. dbl. shafts, 1725 RPM \$34.50 General Electric, cap. type, 3450 RPM \$34.50

Above are 110 V. or 110/220 V. 60 cy. 1 ph. A.C. Motors. All Motor Prices are F.O.B.



SPECIAL BARGAIN OFFER... Brand New! 2 H.P. Repulsion Induction Single Phase Late Style—Name Brand—220 V 60 Cy 3450 Rpm 3/4 Shaft... Only \$65.00. Weight approx. 100 lbs.

Write for CIRCULAR: Listing Motors; ALL SIZES: Fans and Air Compressors — ALL SIZES.

16 TO 1 SPEED REDUCERS For Display Table — Barbecue Spits — Toy Auto Gear Box — Experimental Uses, Etc. Gears Enclosed in Aluminum Housing. Bronze Gear, Hardened Worm. Input 5" aft 1/4 in. Output Shaft 3/4 in. Speed Reducer #R 161. \$5.95 Post Paid

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NAVY Sealed Beam LAMP

U.S. NAVY portable search-spot light. Has pistol-grip & aiming sight. Makes an ideal search, spot or emergency light for auto, boat, etc.

12V light - 4" lens ... **4.29**

24V light - 5" lens ... **4.79**

Set of 3 filters: red, green, amber (specify type lamp) ... **.99c**

4-WAY SWIVEL LAMP

A handy lamp for desk, work bench, chart table, engine room, etc. May be used on 6-12-24 or 110 volt current by simply changing the bulb. Has 3 foot shaft with four

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GOOSENECK LAMP

A Real Surplus Buy! For the Home or Workshop. An ideal lamp for student or craftsman. Has flexible shaft, socket, cord & switch. 110V. AC. **1.25**

GOOSENECK INSPECTION LAMP

Has black bakelite case with a 13 inch tubular metal extension. 7" of the extension is flexible allowing a 180° bend. Ideal for reaching into remote places with plenty of light for inspection, etc. Takes 2 ordinary flashlight batteries & comes with 1 extra bulb. **1.95**

AIRCRAFT CABLE

Rust resistant, alloyed steel. Extra flexible. Pre-formed, 7 x 19 strand. On reels

1/16" - 4 1/2 ft. (7x7) 7/32" - 11 1/2 ft.
5/64" - 5 1/2 ft. (6x7) 1/4" - 12 1/2 ft.
3/32" - 5 1/2 ft. (7x7) 9/32" - 15 ft.
1/8" - 7 1/2 ft. (7x19) 5/16" - 16 1/2 ft.
5/32" - 8 1/2 ft. 3/8" - 18 ft.
3/16" - 10 1/2 ft. 1/2" - 20 ft.

Stainless Steel Cable

1/16" . . . 7 1/2 ft. 5/32" . . . 20 ft.
1/8" . . . 18 ft. 3/16" . . . 23 ft.

FIRE EXTINGUISHER

Kiddle Lux - CO₂ Type. Built to Gov't specifications. Has heavy, shatter-proof case. Recent hydrostatic test. Reconditioned and fully charged. LIKE NEW! All are READY FOR INSTANT USE!

3 1/2 lb. size with Swing Nozzle . . . \$14.95
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SAVE UP TO 85% ON WAR SURPLUS

FROM WORLD FAMOUS 'GADGETEER'S' HEAVEN

TREMENDOUS SAVINGS ON PALLEY HYDRAULICS

Here at Palley's we carry the WORLD'S LARGEST supply of special Hydraulic Equipment. Our huge stocks of Hydraulic Cylinders alone feature over 20,000 units in 61 sizes and types. We also stock thousands of accessories such as Hydraulic Pumps, Transmissions, Valves, Tanks, Fittings, Hose, etc.

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No. 3 - Double Action Cylinder. Bore is 1", Shaft 1/2", Stroke adjusts from 2-1/2" to 4" with internal sleeve stops. Length overall 8-1/2". Will take 1500 lbs. continuous - 3000 lbs. intermittent. Will lift or push 1100 lbs. . . **5.75**

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HYD. HAND PUMP

Has operating pressure of 2000 PSI. Capacity of 1.5 cu. inches per complete cycle. Our special price ONLY. **12.75**

HYDRAULIC ACCUMULATOR

A2C. Designed for pressures up to 2000 PSI. Has a 3" diameter by 18" long. **ONLY 10.75**

Hydraulic PUMP

Has built-in, variable flow control valve in head. Positive displacement, piston type. Displaces .450 cubic inches per revolution. Capacity is 2 GPM at 1400 PSI. Operates at 3750 RPM, intermittent maximum is 4500 RPM. Rotates in either direction. 1" ports. **27.50**

Send 25c Today for Illustrated Catalog of thousands more Hydraulic Bargains.

P-1A PESCO GEAR PUMP

Capacity, 1 1/4 GPM at 1500 RPM at 1500 PSI. Pressure limit is 1500 PSI continuous, with intermittent maximum of 1875 PSI for 15 seconds. Normal operating speed is 3750 RPM with an intermittent maximum speed of 4500 RPM. Rotates right-hand only. **Now 8.95**

BENDIX 4-WAY VALVE

Poppet type. Off at neutral. Has pressure inlet, and return & 2 pressure outlets for operating two cylinders independently. Position of handle selects either cylinder. Can also be used with hydraulic motors. Has 1/4" internal ports with 7/16-20 thread. Overall size is 3" in diameter & 1" thickness. **6.75**

ARMY SURPLUS TOOL BOX

Made of finest Chest Steel. Reinforced corners. Welded piano hinge. Roomy lift-out steel tray. Leather handle. Size 16" x 7" x 7". Ideal for Tools, Tackle or Artists' box. **2.75**

A \$6.95 Value

AUTO PULSE ELECT. PUMP

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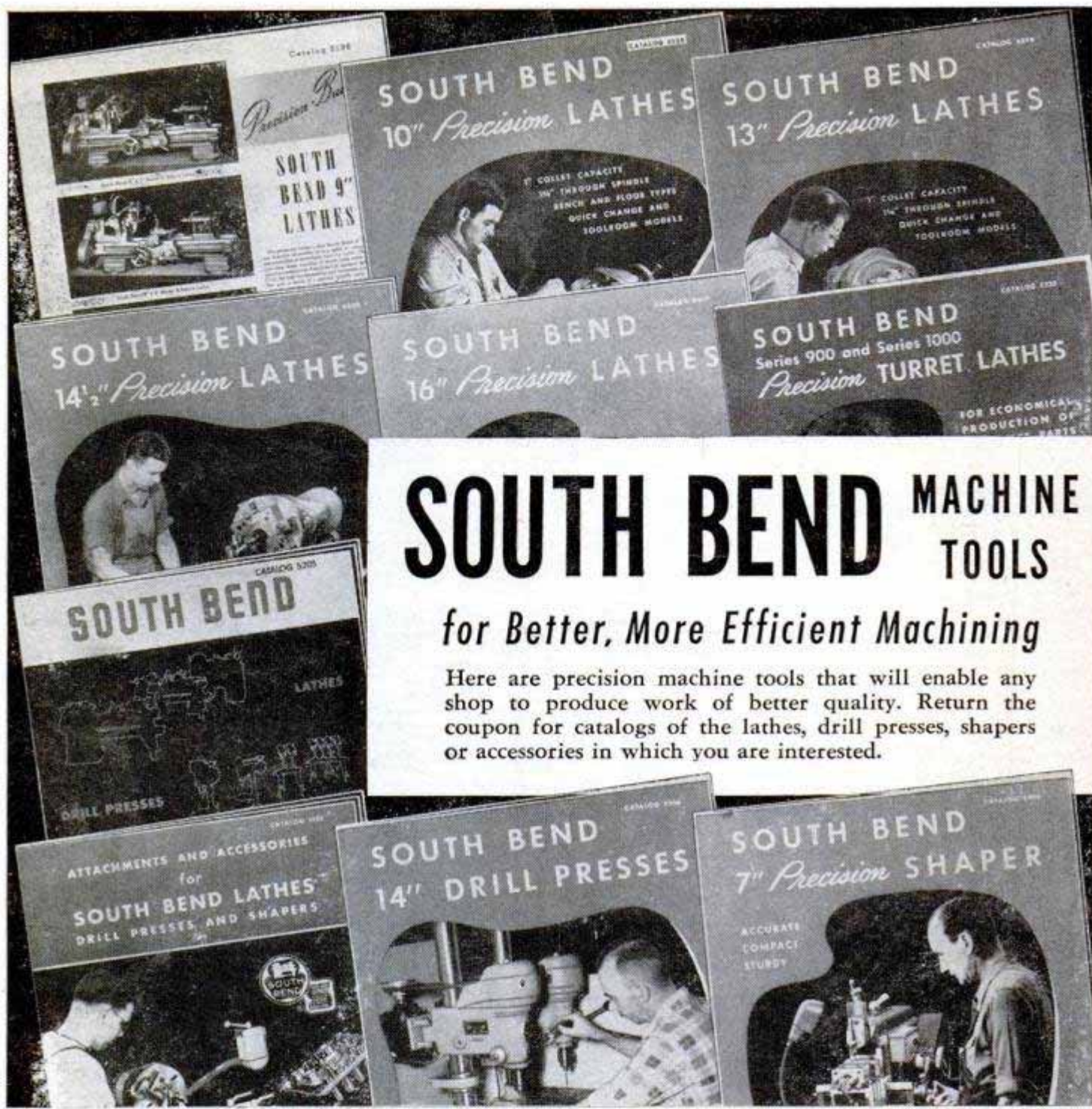
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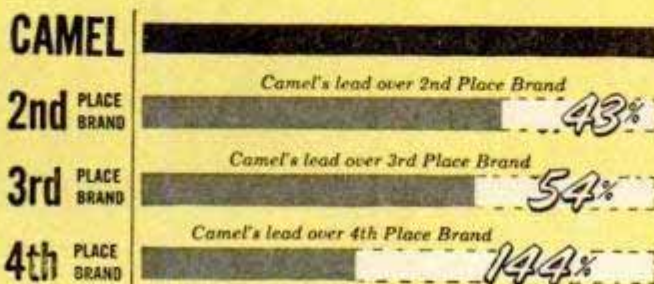
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